

The Promise Of Things To Come:

Atari's New Lease On Life

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When an especially strong earthquake recently shook the California city of Sunnyvale, most of the residents shrugged, smiled nervously, and tried not to think about the next one.

But among the hundreds of people who work for Atari in more than two dozen nondescript buildings there, the quake appeared to be hardly noticed. When you've already had the world turned upside down and are feverishly working to restore your corporate footing, a little more trembling scarcely seems worth worrying about.

In retrospect, the earthshaking that Atari took from the end of 1982, through 1983, and into the early part of 1984, seems to have had the same sort of explosive force that first powered the company into becoming a billion-dollar organization. Almost overnight, Atari went from being king of the videogame and home computer market to being every analyst's example of the boom-and-bust potential inherent in the computer revolution.

World-Class Problems

The litany of problems was indeed world-class: over half a billion dollars in losses for the first three-quarters of 1983, premature announcements of sev-



James Morgan, chairman and chief executive officer of Atari, Inc.

Out of the ashes of a disastrous 1983, a slimmer and more serious Atari, Inc., is fashioning a comeback under the guiding hand of new chairman and CEO James Morgan. In this, the first of a two-part look at Atari and its new products, Morgan talks candidly to COMPUTE! about his company's mistakes, its strengths, its hopes.

eral products that never appeared, the unsuccessful launch of the 1200XL computer, layoffs of hundreds of Atari employees, and a management team wracked with dissension, low morale, and a lack of corporate focus.

Enter James Morgan, a former Phillip Morris marketing executive, who replaced Ray Kassar in September 1983. His mandate from parent company Warner Communications was as simple to state as it was difficult to carry out: Turn Atari around.

"Before I came, this company thought it was a toy company, IBM, and everything in between," says Morgan. "And it was devoting people and resources to all of that."

Energy, Hope, And Resolve

Morgan has not gone about his cleanup at Atari quietly. Instead, he has become one of the most outspoken critics of the company's past policies. He often sounds more like an irate consumer than a computer company president.

In his effort to reshape Atari, Morgan laid off an additional 250 employees last winter, including Chris Crawford, Atari's highly regarded research-and-development director. Also, Atari's chief scientist, Alan Kay, left the company in the spring to join Apple Computer as an Apple Fellow.

Despite these changes—and in some cases because of them—Morgan appears to have brought new energy, new hope,

and a new resolve to Atari's efforts. With an enthusiasm that has been missing for over a year, Atari employees and executives this spring were eagerly preparing for June's Consumer Electronics Show in Chicago and for the 12 months following—commonly acknowledged as the period during which Atari must show the world and Warner Communications that it is back on the right track.

"The Public Still Loves Us"

Morgan is excited—not only about Atari's future plans—but about the company's current strengths, which he believes have been largely overlooked.

"The financial analysts and the computer press have been disenchanted with Atari for several months, but the public still loves us. This gives us a franchise from the consumer to develop the type of microprocessor products that the consumer will want," he says.

"Before we could announce any products though, we had to get a sense of our own self-identity. Who are we? What are our strengths?"

All has not been bleak for Atari. The 600XL and 800XL computers have sold well. In fact, Morgan told analysts earlier this year that Atari could have sold about 40 percent more computers during the Christmas rush if they had been available to ship. And despite dire predictions about the death of the videogame machine, Atari seems confident that this market is stronger than some analysts have estimated.

AtariSoft And Atari Learning Systems

Atari's market share began climbing this past spring. And the company's software division, AtariSoft, and its educational division, Atari Learning Systems, both appear to be doing well.



The AtariLab computer science kit, with its temperature module, brings science into the real world for computer users and is one indication of Atari's commitment to quality educational software.

Linda Gordon, who directs the Atari Learning Systems Group, has a strong team, including Dorothy K. Deringer, formerly program officer with the National Science Foundation. In the burgeoning educational software field, Atari expects this division of the company to offer some of the most innovative and high-quality products for schools and home learning that will be available in the industry.

Products like the recently released AtariLab, a computerized science kit, and a series of other products similar in scope and quality (being introduced at CES) are creating excitement and momentum within the entire Atari organization.

Morgan is quick to point out what he feels are a few of Atari's underlying strengths. "First, the combination of color graphics and sound in Atari computers is better than in our competitors' computers. Second, more people are familiar with Atari than with any other computer company. Remember, 16

million Americans have an Atari computer—a 2600 video-computer system—in their home," he says.

"Third, when people think of Atari, they think of entertainment. That is a tremendous advantage, but not just so we can sell more videogames. Computers can make learning more entertaining. They can even make work more entertaining—as well as more productive."

The Computer Of 1990

But Morgan is frank about what he feels Atari must do in the future to reestablish itself as a creative and credible force in the microcomputer field. A committee Morgan chairs at Atari, called "The Computer of 1990," meets frequently to brainstorm about future directions. Division heads and product managers reportedly have more communication with one another than in the past. And products or strategies that once went unquestioned, have all undergone Morgan's scrutiny.

For example, the popular

Atari Program Exchange (APX), a division of the company which purchased, produced, and marketed consumer-written programs for Atari computers, has been drastically reshaped.

"Atari has redeployed some of its resources and programs so that they are more consistent with the current goals of the company," says Morgan. "In the case of APX, Atari has discontinued the mail-order portion of the program. Atari lost money in this portion of the business.

"Moreover, Atari had to come to grips with the fact that Atari is not in the mail-order business. However, APX will continue to review products sent to Atari by outside programmers," he says. "If the programs are topnotch, they will be added to the main Atari catalogue. Otherwise, they will not be sold by Atari in any fashion."

The Fate Of The 1450XLD?

Morgan also took a hard look at Atari's plans for a high-end computer. The 1400XL and the 1450XLD, announced at the June 1983 Consumer Electronics Show (CES), were never released. The 1400 was unceremoniously dropped, and the 1450, although exhibited at the January CES, was not yet on the market.

"Atari will sell a high-end computer in 1984," Morgan now says, "but the specific product features of that high-end machine still are under review. We showed the 1450XLD at the Consumer Electronics Show in January of 1984 to demonstrate our intent to market a high-end machine this year."

In fact, by the time you read this, Atari may well be marketing such a computer. And this points to one of the major changes Morgan has instituted at Atari: "We want Atari to be seen as the consumer's

friend," he says. "That means we don't announce any products unless we are willing to back them 100 percent."

Enhancing Lives Through Interactive Electronics

Morgan also makes it clear that Atari has no intention of abandoning the computer market.

"That's the real tragedy of Atari. Despite a record of several excellent computers, we are still known as a videogame company" he says. "But we're going to change that. Over the next 18 months, we will be introducing a host of new products that will create an awareness and acceptance of Atari as being a superior computer manufacturer."

While Atari's product line will be more focused than in the past, the company's new strengths will have a broader base, Morgan suggests. "Our goal isn't to just produce computers. It is to produce products that enhance consumers' lives through interactive electronics."

"Invisible" Computers

"To think this way, we have to think beyond user friendliness and beyond desktop computers. We have to think of products that are *invisible*."

"For example, a truly friendly product should not separate you from the task at hand. It should be like a refrigerator—you just reach inside the door and get what you need. After all," he says, "the product, any product, is not a hero. It is just a medium. It is the carrier of what is important."

Morgan clearly expects June's CES show in Chicago to be a major first step in the company's introduction of new products aimed at carrying Atari back to critical and financial success. But he has not limited Atari to the introduction of products at trade shows.

Tuning In To The Consumer

In early May, Atari announced new Lucasfilm games—*Ballblazer* and *Rescue on Fractalus*—which Atari has developed in association with the special-effects wizards at the well-known motion picture company. And by the time you read this, Atari is scheduled to have premiered a new high-end game machine, the 7800 Pro System. Both of these new products were scheduled to be shown at CES in June as well.

"Our major priority at Atari is to tune in to the consumer. Ultimately, the home computer is not an entity unto itself. It is not a question of what a computer can do. It is a question of what a consumer does with it," Morgan says.

"In my opinion, we still have not given consumers a compelling reason to buy a computer. And we haven't spent enough time molding our products to consumers' desires."

Atari's "Smart" Telephone

"For example, most people like to communicate with other people," he says. "That is a real need and a real desire. And computers can help people communicate. But it's not easy. You have to type all sorts of special codes and commands, just to get started. Instead, it should be just as easy as using a phone. You should be able to press a couple of buttons and communicate."

Morgan says that AtariTel, the company's telecommunications division, will introduce "smart telephones" in the second half of 1984. "These telephones will be microprocessor-based. We currently are deciding how we will market the product," he adds.

While redirecting Atari's efforts, Morgan has also studied the microcomputer industry as well. And one of the major

problems still troubling the industry, he emphasizes, is that home computer technology is ahead of the average consumer without matching the consumer's real needs. The challenge, therefore, is for computer manufacturers to translate this new technology, while at the same time giving prospective buyers genuine reasons to purchase a computer.

Alan Alda Is The Bridge

Assisting in Atari's efforts to explain its computers is actor Alan Alda, who represents what Morgan calls a "bridge" to adults by selling the application of Atari technology, and the ease of use.

"He [Alda] always picks one activity, like word processing, or education, and shows you how you can do it on an Atari. Alan doesn't want to make adults buy computers because they feel guilty. He wants them to buy a computer because they're excited about doing

something they have seen *him* do," says Morgan.

"Also, he never sells RAM, ROM, or CPUs. The CPU is the least important element in the computer. It is like the engine of a car. Most people buy a car without opening the hood," he says. "There is a common understanding among car owners that the engine will work, and it will get them where they're going. The CPU is like the engine. You've got to have it, but you don't sell computers because of it alone."

Morgan's Open Letter

Morgan's impact at Atari has not only been felt directly by his employees. He has also gone out of his way to be accessible to industry analysts, the press, and—most importantly—the thousands of loyal Atari owners who are both a present and future market and a formidable, knowledgeable circle of critics.

A personal and candid letter from Morgan to Atari owners

popped up on the message section of CompuServe earlier this year, for example. In the note, Morgan thanked them for their support and criticism, explained his view of Atari's past problems, and requested their continued interest in Atari's future.

This kind of attention to personal detail, and the simultaneous redirection of Atari's efforts, have done much to restore the morale among Atari employees and have helped give the company valuable time in which to develop, and properly introduce, new products.

Frank Questions And Open Communication

Morgan seems to understand that his role must be multifaceted. "I act as a catalyst to the Atari management team, which has the real job of running this company," he says. "I try to set the tone for the management committee and I help point the group in certain directions.

"As someone who joined this industry as an outsider, I have been able to take a fresh look at the entire consumer electronics field in general and this company, in particular. I'm not afraid to ask frank questions, and also question why we do things the way we do. I encourage all Atari employees to examine their own work in the same way.

"I believe strongly that one of my biggest contributions to Atari will be the implementation of a corporate culture here that inspires teamwork and open communications," Morgan says. "I want to encourage people to take calculated risks and not be afraid to fail. That's part of being an excellent company. If we become an excellent company, then sales and profits will follow."

(Next month, COMPUTE! will take an in-depth look at Atari's new product line from the Summer Consumer Electronics Show.)

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The Robot Teddy Bear

Just about this time last year my three-year-old son, Eric, and I went to the World Science Fiction Convention in Chicago. It was an experience neither of us will ever forget.

The hotel where the convention took place was filled with over 7,000 science fiction movie makers, writers, hucksters, and fans. Most of the fans were in costume.

Since the fans were in costume, Eric and I decided to wear costumes, too. We went with three friends we were staying with in Chicago. Hope (8 years old) dressed as a bride, Felicity (10) as a princess, Hugh (6) as an Indian, Eric was the Lone Ranger, and I went in the most bizarre costume of all—a business suit with a narrow tie, dark shoes, and a briefcase.

The kids' costumes fit right in, but my costume got a lot of surprised and baffled stares. Each time someone stared at me in wonder, I secretly patted myself on the back for my originality.

You Will Always Be In My Memory Bank

Eric and I returned to the convention on another day by ourselves. That's when Eric met Denby, a show robot from the International Robotics Corporation in Dearborn, Michigan. Denby was about six feet tall and all white except for a "billboard" advertisement on the front of his cylindrical body that advertised two of the leading science fiction magazines.

Denby was a real character. When he spotted Eric, he rolled over and greeted him. "What's your name, young man?" he asked.

Eric told him his name. He also told Denby about his mother, his sister, and his black cat, Mowie. He told Denby he had seen Darth Vader and Yoda at the convention, and that he had worn his Lone Ranger outfit last time he was there.

Denby told Eric that he was the nicest little

boy he had seen at the entire convention.

Eric shook Denby's hand and gave him a big hug. Denby got so excited he started bouncing around the floor, spinning his head, and blinking his baby-blue eyes. "Whooweee!" he said.

Denby told Eric good-bye and rolled off across the convention floor. That didn't shake Eric. He followed Denby around the convention, up an elevator, and into a conference room. He didn't miss an opportunity to engage Denby in further conversation, shake his "gripper" hand, and give him kisses and hugs. (Eric couldn't reach more than a third of the way around Denby's barrel waist, so he hugged Denby's leg.)

Denby was a nice robot. Every time Eric appeared he acted really happy to see him. I think he must have realized that he had stolen Eric's heart.

Eric finally said good-bye to Denby, but not before he had collected a Polaroid photo of himself and Denby in front of the OMNI magazine booth, and another 8 x 10 color photo of Denby, complete with Denby's personalized autograph. On the photo Denby wrote: "To Eric, You will always be in my memory bank."

Now, a year later, the photos are still among Eric's prized possessions. One hangs on his bedroom wall; the other sits on his dresser and often gets taken to bed.

Eric Meets Little Denby

Big Denby made such an impression on Eric that when I saw a little toy robot at one of the booths at the convention, I immediately picked it up.

The new robot became known as "Little Denby," then simply as "Denby."

From the first night he got him, Eric began taking Denby to bed with him, like a mechanical teddy bear.

Denby does not look like a teddy bear. He



TOPO the robot flanked by D'Ignazio family (from left): Catie, Fred, Janet, Eric
Credit: Roanoke Times & World-News. Photo by Wayne Deel

is made of hard, black plastic. And his eyes flash when he is turned on. But, to Eric, Little Denby is like a teddy bear. He is Eric's link to his friend Big Denby. And few people—biological or mechanical—ever made as deep an impression on Eric as Big Denby.

My Best Wishes To Everybody!

Learning to live intimately with a robot has not exactly been easy.

When Eric and I returned from Chicago, he continued taking Little Denby to bed with him every night. I remember nights when I would wake up and hear Eric crying in his bedroom. I would rush in and Eric would sob and tell me "Denby hit me" or "Denby stuck me." Eric had rolled over on Denby in his sleep. Denby is hard with lots of angles and bumps. He is not the kind of robot you can snuggle with and escape unbruised.

One night shortly after Eric and I returned from Chicago, my wife Janet and I were sound

asleep in our room when I heard a loud *clunk!* come from Eric's bedroom.

Then came a loud, shrill air-raid siren.

Janet and I sat up in bed, alarmed and confused. We began climbing out of bed, and the siren stopped. Then, real loud, a buzzing, mechanical voice announced, "I am the atomic robot! My best wishes to *everybody!*"

It was Denby. He had fallen out of Eric's bed and landed on his head. On Denby's head is a yellow button. When you press the button (even when Denby is turned off), Denby makes an air-raid siren noise and tells every one who he is and wishes them his best. And Denby doesn't just say these things. He blasts them out like a bullhorn.

This is an okay feature for a robot to have during the daylight hours, but when a robot does this at two in the morning it can make you come unglued.

One further qualification: Robots should only be seen and not heard in the middle of the night or *in a car*. I don't know how many car trips we've taken where we have had to confiscate Denby from Eric and my daughter Catie. When Denby shouts out his greetings from the back

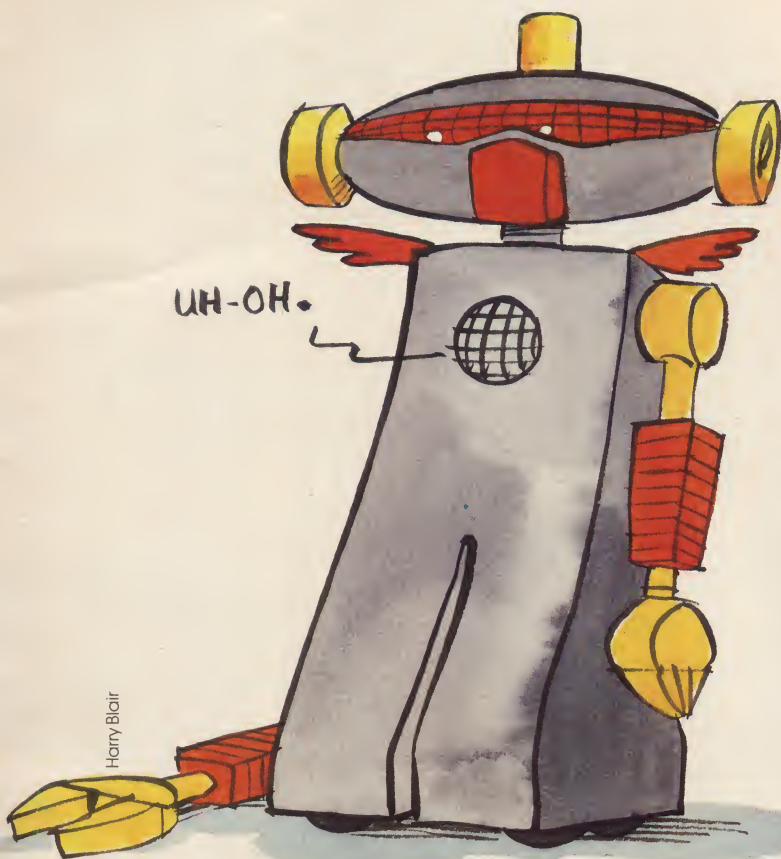
seat, and, worse, when his alarm goes off unexpectedly, it takes all the self-control I've got to keep from swerving the car into a tree.

The One-Armed Robot

When children fall in love with dolls, blankets, and stuffed animals, they carry them around everywhere. Eventually the object of the child's affection begins to take on a very different look. It looks more and more faded, pummelled, mauled, unpleasant, and unhygienic.

My daughter, for example, had a mouse ("Mousie") that had been hugged and carried so much its skin grew so thin that its stuffing *started* leaking through. And she had a blue blanket ("Ni-Ni") that, despite frequent washings, took on a greasy gray color and looked more like a shredded garbage bag than a child's blanket.

The same is true of robots. Except they're more sturdy. Eventually, however, all that love and affection begins to get to them. After a while they begin to look as ragged as a favorite stuffed



doll or blanket.

Denby is a very tough little robot. For several months he continued to look as good as new. Then, one day, Eric decided to "walk" Denby down the basement stairs. Denby is only ten inches high, and he has no legs—just wheels. He made it to the top of the first stair, then he turned into a robotic pogo stick and bounced his way down the remaining stairs.

That was how Denby lost his arm.

(The arm still sits, forlorn looking, in a small demitasse coffee cup in the kitchen. Janet has performed several surgical operations with Krazy Glue and Miracle Glue to try to reattach the arm to Denby. The arm stays on Denby for a short time, to Eric's acute joy and pleasure. Eventually, however, the arm ends up back in the coffee cup.)

On that same trip down the basement stairs the little door on Denby's bottom burst open and spilled Denby's batteries all over the basement floor.

Today Denby wears a truss—three arcade-store game tokens underneath four layers of masking tape fastened to his bottom. The tokens and the tape keep Denby's batteries inside his body where they belong. But they don't always work, and this makes Denby sort of cranky and unpredictable. Sometimes he races around the kitchen floor, but sometimes he just sits on the floor and makes his air-raid siren in slow motion. It sounds a lot like a whine.

TOPO, The Bag Lady

We recently acquired a new member of our family—TOPO the robot from Androbot (101 East Daggett Drive, San Jose, CA 95134, 408/BOB-TOPO). Now we are a three-robot family (including the robot turtle who lives in the piano room).

I think TOPO looks fine just the way he came out of the packing crate from the factory—like a little white snowman. But my kids think differently. He must look naked to them, because ever since we first got him they have been dressing him up.

At different times TOPO has worn capes, shawls, cowboy guns, hats, flags, bracelets, and rainbow-colored Smurf belts. But my favorite is the time my kids dressed TOPO as a bag lady.

One night, very late, I was going around the house turning off lights and making sure all the doors were locked. I went into my daughter Catie's room. She was sleeping soundly. Then I went into Eric's room.

I got the shock of my life!

Looming over Eric's bed was a small figure dressed in a shawl, a scarf, and a faded purple skirt. It looked like a pygmy bag lady. The bag lady carried a bulging paper sack in each arm. Large, tacky, plastic bracelets dangled from her wrists.

And there was more. In the darkened bedroom she seemed somehow ominous and threatening. I think it must have been the white plastic Dracula teeth taped to her mouth.

I was relieved when I finally realized that the creature in my son's room was TOPO the robot. Then I grew amused. It was that "Look what I've gotten myself into" feeling that I often get when I hang around Catie and Eric. You see, when we got TOPO I didn't realize what we were doing. I thought we were acquiring a robot. But we weren't acquiring a robot, we were adopting a pygmy bag lady—a pygmy bag lady *vampire*.

Just what every family needs.

Now You Can Be Real To Everyone

When I was a kid one of my favorite stories was *The Velveteen Rabbit* by Margery Williams. The story is fairly well known, but the subtitle is less familiar: *How Toys Become Real*.

Denby and TOPO remind me of the velveteen rabbit. When they first arrived they were just "things." But before long they became vital members of our family. Now we talk about them as if they have personalities, ideas, and feelings. We act as if they are *real*.

On ABC-TV's *World News* program last night, Peter Jennings, the show's anchor person, went to a teddy-bear convention. The title of the piece was "America Is Bullish on Bears." Hundreds of people had come to this convention with their favorite teddy bears. There were fat bears, beauti-

ful bears, dumpy bears, big bears, and bears the size of pins and match sticks. There were wise bears, silly bears, watch bears, and guard bears.

The people who own teddy bears love them as much as we love our robots, maybe even more. To those people, the bears are alive. They are real.

How do robots and bears become members of your family? How do toys become real?

They become real when we project our ideas, thoughts, personalities, and feelings into them. It's the same thing novelists do when they create characters with words on paper. They create lifelike beings who inhabit the pages of their books.

And, almost as soon as we project lifelike traits into them, our toys become independent from their creators. They seem to have an identity all their own. They seem to exist whether or not we are around to project life into them. We never know what to expect from them. Their thoughts, feelings, and imaginary actions are always a surprise. We can't predict what they'll do next. All their actions are consistent with the personality that they have evolved, but they are not preprogrammed or "mechanical."

The reality of the teddy bear or robot is greatly heightened when its personality becomes a shared fantasy among several family members or friends. Then it becomes an ongoing "joint invention" of several people. When we hear other people talk about these creatures as if they were real, we come to accept their reality even more than before.

Robot Maids And Butlers

All of this brings me to the conclusion that the real reason we will buy robots by the thousands and millions is *not* so they can become our household servants. Instead we will buy them so they can become our pets, our companions, and our friends—just like a dog, a cat, a blanket, a teddy bear, or a velveteen rabbit.

According to most robotics experts, we are a couple of decades away from general-purpose household-servant robots. The sensors and computers in today's robots are too primitive for a robot maid or butler to survive in the hubbub and chaos of the average home.

Yet there are a dozen companies which are already marketing relatively low-cost "consumer" robots destined for the classroom or the home.

In *People* magazine and on TV talk shows, we see robot owners and their robots acting out our fantasies about what we'd do if we had our own personal robot. The robots are shown walking the dog, washing a window, or bringing the man of the house a beer while he reads the evening paper or watches a football game on TV.

This is silly!

How do you program a blind, wheeled robot who only accepts hexadecimal commands to walk

a dog around the neighborhood?

How do you get a two-foot-high robot who can't pick up a dishcloth to go to the refrigerator, open the door, pick out a beer, and somehow find the TV room?

Even robot sentries and guard dogs are pure fantasy—a dangerous fantasy. I know how much trouble my parents and their friends have with their computerized security alarms they have purchased for their homes. They are constantly setting off the alarms and sending the police and the fire trucks to their homes by accident.

How would *you* like to face a guard-dog robot armed with mace, tear gas, or an electrified snout? Would you trust that robot to consistently distinguish you from a burglar or robber? Would you trust that robot alone with your children?

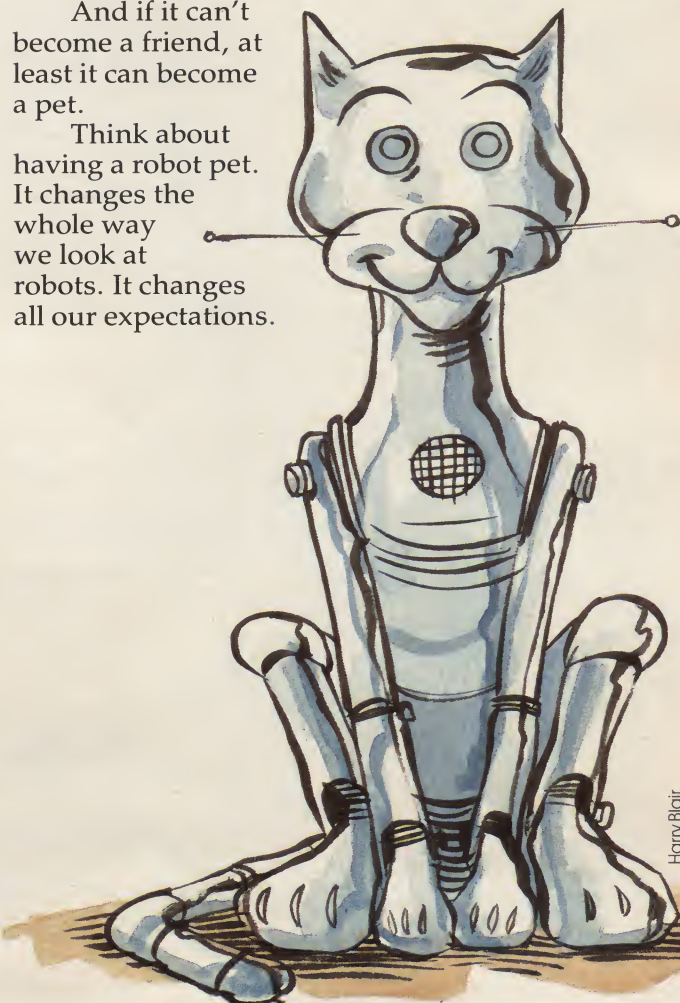
Why Buy A Robot?

Several months ago I wrote a number of columns about a "computer friend" that parents could program for their children. I said that, ultimately, user-friendly computers would evolve into computer friends, and not just for our children.

Now I think that the biggest justification for buying a robot is that it can become a friend—to our children and to us.

And if it can't become a friend, at least it can become a pet.

Think about having a robot pet. It changes the whole way we look at robots. It changes all our expectations.



If we look at robots as servants, we expect them to be convenient, hardworking, labor-saving devices. This, robots emphatically are not.

But if we expect robots to act like pets—like the family cat, dog, guinea pig, or goldfish—then we have a whole new set of expectations. And we can define a whole new set of standards. These standards can be just as rigorous as the standards for a robot maid or butler. But they can also be a lot more realistic.

We don't expect our dog or cat to wash dishes or take out the trash. We sometimes expect them to guard and protect us, but their performance in this area (as anyone who has ever had a watchdog will attest) is notoriously spotty. Our fearless watchdog might lick a burglar's hand, then turn around and bite the newspaper boy on the seat of the pants.

What can we expect from robot pets?

First, we can expect them to be lovable. To be lovable they should be cuddly, fuzzy, and huggable. They should be small enough so we can pick them up and carry them around with us. They should be "lap robots."

Also, they shouldn't be perfect. They should be just as quirky and silly as our cat or our pet gerbil. On occasion, they should be naughty, they should pout, they should be perverse and impossible. Or they should at least give the right appearance. We can easily imagine the rest.

Second, they should be teachable. We should be able to "imprint" ourselves as much on them as they do on us. They should learn our names, our favorite interests, jokes, and whimsies. They should be nice to us. They should be like the big old dog who acts like he is excited to see us when we come through the front door, or like the cat who can't wait to hop in our lap the moment we sit down.

Third, they should be tough. They should wear more like Denby than like a teddy bear or a blanket. They should be survivors of a lot of rough-and-tumble affection.

Fourth, they should be portable. They should be able to go on car, train, and plane rides. They should be able to go on vacations to the beach and still work even though they have sand in their sensors.

Fifth, they should teach us. They can teach us formal things like arithmetic, the names of countries and presidents, and the spelling of polysyllabic words. But they should also teach us little intangible things, like loyalty, affection, trust, ethics, and values. They should learn our values then echo them to our children and our friends.

They Could Become Friends

We should remember that robots are, above all, creatures of our imaginations. That is why we find them so fascinating. The more a robot en-

courages us to use our imagination when we deal with it, the more successful that robot will be. On the other hand, the more a robot tries to act like a mobile appliance, the more it will set us up for frustration and disappointment.

After all, what is a robot? I'm not sure I can answer my own question. But I do know that a robot is something more than an average machine like a dishwasher or vacuum cleaner. We project a great deal of ourselves into robots. We do not do this with vacuum cleaners and dishwashers.

What else do we project ourselves into? We project ourselves into pets, dolls, and toys. This is why we value these creatures more than our vacuum cleaners and dishwashers. It would be a shame if we were to build robots to imitate common household appliances. Then we would devalue our robots and they could never realize their potential. They could never be truly real.

If we want robots to become real, we should stop trying to get them to "grow up" and become common appliances. Instead we should direct them toward their greatest potential—to become mirrors of our minds, our feelings, and our imaginations. Today, using current technology, robots cannot become our household servants. But today's robots can become our toys and our pets. And, perhaps someday they may become our friends. ©



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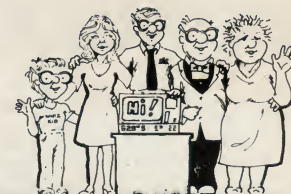
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Robots That Roll, Crawl, And Bounce

Fred D'Ignazio, Associate Editor

The World Headquarters For Robots

Where is the world headquarters for robots? Is it in Japan, England, the Soviet Union? Probably not. It's probably right here in the United States at the Robotics Institute. The institute is part of Carnegie-Mellon University, in Pittsburgh, Pennsylvania.

The Robotics Institute was established in 1979. Eighty scientists and engineers and over 60 students work on the institute's multimillion-dollar projects to invent new, advanced computers and robots. The institute's 17 corporate sponsors watch the research closely. They are hoping the scientists and students will invent robots and computers that their companies can use in their business.

A Robot That Crawls

All the robots at the institute are exciting, but the most interesting robots are the ones that move. There are three types of mobile robots: a wheeled robot named Rover, a six-legged robot that crawls, and a couple of bouncing robot pogo sticks.

The crawling robot is one of the first six-legged robots (or *hexapods*) in the world. Earlier hexapods were built in Japan and in the U.S. And there is even an octopod (an eight-legged robot), built by scientists in the Soviet Union.

In order to walk, the earlier hexapod robots divided up their six legs into two tripods of three legs each. To take a step they would raise three legs. To keep from falling they would keep three legs on the ground (in the shape of a triangle—or tripod). In this way, the hexapod could move, but it didn't need to maintain its balance since it always had three legs on the ground.

The institute's hexapod robot can walk using the tripod method. But it is capable of using other methods as well. Its inventor, Ivan Sutherland, studied the motion of several animals, including

four-legged horses and six-legged insects. He programmed the robot to use some of the same patterns that real animals use.

Each of the six legs on the robot has its own microcomputer to control the leg. The computers communicate with each other and with a central supervisor computer to make sure the robot accomplishes its main objective: crawling. Without the computers working together, the robots' six legs would become jerky and spastic. Instead of walking it might begin doing deep knee bends or keel over.

A human can ride Sutherland's hexapod. Even though the robot has lots of little computers to help it walk, a human can do some important things to help the robot get where it's going. The rider can adjust the *attitude*, or tilt, of the robot so it won't tip over on hillsides or rocks. He can adjust the robot's clearance so that the robot doesn't scrape its tummy on sharp stones, tree branches, and other objects it passes over. And he can help the robot decide where to place its feet. This is especially important when the robot is walking near a hole, next to a cliff, or beside a puddle.

However, the most important reason to have a human ride on the robot is not to help it walk. It's to use the robot as an intelligent, legged jeep or land rover—to get somewhere that no wheeled vehicle could reach.

But don't expect to get there fast. Sutherland's hexapod travels at only two miles per hour.

A Robot That Bounces

Perhaps the strangest robot at the institute is Marc Raibert's bouncing pogo stick. The robot has no arms or head, only a body and a leg—one leg. The leg keeps its balance and moves forward by hopping, just like a kangaroo.

Raibert built the robot (or *monopod*) to help him study how creatures balance themselves. The

A New Age Of Discovery

Someday, maybe 10 or 20 years from now, an exciting new Age of Discovery will begin. It will be comparable to the 1400s, 1500s, and 1600s, when European explorers spanned the globe. Yet most of the explorers this time won't be people, they'll be robots. Many of the robots will be descendants of the rolling, crawling, and hopping robots being developed at the Robotics Institute.

Today's robots are not very intelligent. Their senses are primitive, and their movements are jerky and limited. A robot "explorer" of today might not be able to find its way out of your bedroom.

But tomorrow's robots will be different. They will be smarter, more agile, and have advanced vision, hearing, touching, and other senses. They will still not be as sharp as a human being, but they will be far sturdier. They will be fabricated out of metal, durable plastic, and crystalline graphite. The robots will be able to survive in the extreme cold, the killing vacuum, and the awful radiation of outer space. They will be able to withstand the tons of pressure and cold, numbing water beneath the seas and the extreme heat under the earth's surface. They will go where

no man or woman has gone before.

They will work in mines and factories on the far side of the moon, on Mars, on the moons of Saturn and Jupiter, in the Asteroid Belt, and in deep space.

They will dive to the bottom of the ocean, perform salvage operations on sunken ships, and mine and farm the ocean floor.

They will shrink down to microscopic size and become the eyes and fingers of surgeons as they travel on a fantastic voyage inside a person's veins, arteries, stomach, or lungs.

They will work in dark, dirty mines far beneath the ground, in erupting volcanoes, nuclear power plants, and amidst shrieking hurricanes. They will travel along miles of labyrinthine air ducts, sewers, and oil pipelines that are too narrow or too hazardous for human beings.

Robots will also work with human beings as their expert helpers and companions. Human beings and legged robots will scale tall mountains together, inspect and guard pipelines across the Arctic tundra, journey to the South Pole and through the unmapped interior of the Amazon jungle.

first version of his robot can fall down in only one direction since it is supported by a cushion of air blown out of a tilted wall to one side. A new version of the robot, now being built, will resemble a pogo stick wearing a bicycle helmet. The new robot will be able to balance entirely on its own.

It will be some time before one-legged, bouncing robots can leap tall buildings in a single bound. But Raibert's robot has already shown that it can leap onto curbs and over six-inch stacks of blocks.

The robot maintains its balance, even while jumping, by paying attention to a group of *sensors* (electronic senses) that send it information about its speed, the length and angle of its leg, and the texture and tilt of the surface it is hopping on.

The leg does not have its own onboard computer. Instead it functions on a "leash," an electronic tether attached to a high-speed computer in the lab. The robot's cord is actually more like an umbilical cord than a leash since the cord pipes in compressed air and pressurized oil, along with computer instructions. The robot uses the compressed air to power the leg and jump; it uses the pressurized oil to adjust the angle of its hips and leg to maintain its balance.

Sutherland's crawling boat and Raibert's bouncing pogo stick are a far cry from the walking robots in the *Star Wars* movies. But they are forerunners of robots of that size and complexity. Compared to factory robots that are bolted to the floor, these first legged robots are a great step forward.

The Robot Rover

There is another exciting robot at the Robotics Institute. It moves on old-fashioned wheels instead of legs. But it is one of the most advanced robots anywhere in the world. It is Hans Moravec's mobile robot Rover.

In shape and size, the Rover is a distant cousin of R2-D2. But it has more the appearance of a small barrel than that of a movie superstar. It is approximately one meter high, rests on three independently computer-controlled wheels, and is 50 centimeters in diameter. It is powered by six lead-acid batteries.

Atop Rover's head is a small model railroad track. On the track is a video camera resting on a little cart. The camera is Rover's lone "eye." But its eye can move up and down the track, swivel back and forth sideways, and tilt up and down.

With a quick signal from one of Rover's computers, the robot can swing its eye around and see in any direction.

Rover's guidance computer gets much of its information from the digitized patterns sent to it by the video camera. These patterns consist of tiny squares of light and shadow transmitted by the camera and translated by the computer into electronic bits of information. Together, the light and dark squares might represent a chair directly in front of Rover, or a person's knee. Rover's vision computer tries to decide which.

Rover has other ways of obtaining information about its world. It has an infrared sensor that detects the heat given off by different objects in the room. This sensor warns Rover if there is any danger of crashing into something.

And it has a bat-like sonar device that transmits a high-frequency sound wave, bounces it off a nearby object, and catches the wave when it returns, like a boomerang. A special *proximity* computer calculates how long it took the wave to make its complete trip. The result of this calculation is a new tidbit of information for Rover's guidance system. Now it knows how far it is from nearby objects. This enables it to plan how to get where it is going based on where it is now. It steers clear of any obstacles in its path.

Rover's 15 onboard computers let it do a lot of thinking on its own. But it still needs the help of a high-speed computer nearby to process the millions of bits of information that flood into its system from the TV camera. It sends this information over a UHF (Ultra-High Frequency, TV-like) channel. It gets the digested visual information back by way of an infrared wave transmitted by the computer. The infrared and UHF signals give Rover a lot more freedom. It can move about its world without being tethered by a wire to the computer (like the robot pogo stick). Robots with wires are somewhat free, but they often end up like a dog tied to a leash in the backyard—all tangled up.

One of the most interesting things about Rover is its control program, or rather its "orchestra" of programs. Rover's chief program is called the *conductor* because it coordinates all the other programs running on all the other computers. It must keep all the programs working in harmony, or Rover would crash into walls, fall off ledges, or maybe even stop working from total confusion.

Rover uses an electronic "blackboard" to keep from getting confused. The blackboard handles all the messages sent by each computer to the central conductor computer and to all other computers. A special computer (a high-speed Motorola 68000 chip) stores the blackboard in Rover's memory. As new messages flash in, the computer posts them on the blackboard to share with all the other computers. This way, anytime one of Rover's computers wants information—say, on what Rover sees, or how far its wheels have turned, or what its current destination is—the computer just has to check on the blackboard.

Rovers Of The Future

Rover's inventor, Hans Moravec, had to wrestle with hundreds of problems every day, just to design Rover and build it from scratch. He had to worry about the type of motors used inside the Rover (brushless), the number of computers to include (15), how to program the computers (using a "blackboard" system), and how to send signals from the main computer to the Rover's onboard computers (by UHF and infrared signals).

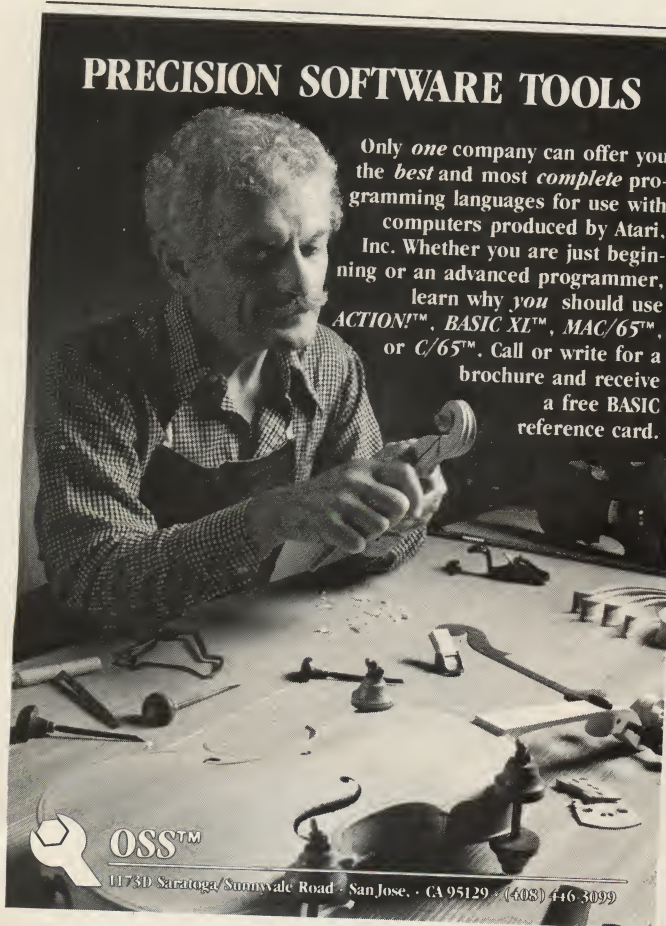
Yet Moravec never loses sight of his long-range objectives. His current Rover is a prisoner of the laboratory. It couldn't survive in the real world just outside the laboratory door. But the Rover's descendants will venture far beyond the laboratory—deep under the ocean, down beneath the earth's surface, and far out into the unexplored reaches of the solar system and beyond.

Moravec is already designing new, improved Rovers of the future. And he is busy planning all the exciting things they will do.

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Computer Popcorn

Fred D'Ignazio, Associate Editor



Last night I woke up in the dark with my head spinning. I turned to the digital clock beside the bed. It said 3:00 a.m. Musical notes and rainbow-colored rubber bands bounced around inside my mind. Over and over, a little voice inside me kept repeating two words: "Computer popcorn. Computer popcorn. Computer popcorn."

The voice told me that I was supposed to get out of my warm bed and go into my dark, cold study. And what was I supposed to do when I got there? I was supposed to write about *computer popcorn*.

When I protested that it was the middle of the night and that I didn't want to get out of bed, the voice became surly. "If you don't get out of bed," it said, "you'll forget everything by morning."

"Forget what?" I thought.

"Computer popcorn," said the voice. "Computer popcorn is a computer program that is so good you can't put it down. You can't stop thinking about it. You even dream about it."

Fred D'Ignazio is a computer enthusiast and author of several books on computers for young people. His books include Katie and the Computer (Creative Computing), Chip Mitchell: The Case of the Stolen Computer Brains (Dutton/Lodestar), The Star Wars Question and Answer Book About Computers (Random House), and How To Get Intimate With Your Computer (A 10-Step Plan To Conquer Computer Anxiety) (McGraw-Hill).

As the father of two young children, Fred has become concerned with introducing the computer to children as a wonderful tool rather than as a forbidding electronic device. His column appears monthly in COMPUTE!.

Dreaming In French

At different periods of my life I have become so obsessed by and so immersed in a new subject that I can't stop thinking about it. I even take it to bed with me at night.

For example, I spent a couple of months backpacking around Europe one summer when I was in college. I spent the first night away from home in a hostel in Paris with a lot of my college



friends. The next morning they all yelled at me. "You kept us awake all night," they complained. "We don't know what you said, but it was all in French."

I used to be an international relations major. I learned a lot of languages and visited a lot of countries. When I visited Mexico I dreamed in Spanish. When I went to Brazil I dreamed in Portuguese.

I doubt if my French, my Spanish, and my Portuguese were grammatically correct, and I'm

sure my pronunciation was not perfect. But the important thing is that I was excited about exploring a country and a new culture—so excited that I continued my exploration even while I was asleep.

Doorways Into New Worlds

This experience is a little like a religious conversion. It is a sense of rapture that you feel when you throw open a door and see endless vistas you've never imagined. Then you step through the door.

This is the feeling I've gotten recently from some of the new programs and computer peripherals I've been reviewing. In this article I'll take a look at one of these programs (*The Music Construction Set* from Electronic Arts) and a combined program/peripheral (the KoalaPad and the *Micro Illustrator* program from Koala Technologies).

Mechanical Drawing

When I was in high school, I took two classes that I thought were particularly painful. One class was mechanical drawing. The other was geometry. I found these classes so agonizing because they both involved the painstaking, *precise* drawing of geometric figures. In geometry class we mostly stuck to two-dimensional figures like squares, triangles, circles, and polygons. In mechanical drawing we began with blocks and cubes, and ended up drawing spaceship nose cones, automobile crankshafts, and "exploded" watch gears.

Surprisingly, I got good grades in both classes. I got the grades because I was such a perfectionist. I would struggle with the assignments for hours and finally turn out a beautiful, finished drawing.

But I hated every minute of it. By the time I finished doing the drawings my arm, wrist, and finger muscles felt so cramped I thought I would go crazy.

And I never thought about what I had drawn. I was too exhausted just getting the shapes down on the paper. The engineering and mathematical concepts underlying these drawings went right over my head. I never even considered them.

Rainbow-Colored Rubber Bands

With images of nose cones and polygons floating through my mind, I sat down for the first time and tried a new product, the KoalaPad from Koala Technologies (4962 El Camino Real, Suite 125, Los Altos, CA 94022, 415/964-2992).

You can buy a KoalaPad for \$125 and all supporting software packages for less than \$50. Different versions of the KoalaPad are made for the IBM PC; the Apple II, II+, and IIfx; the Commodore 64; and the Atari 400, 800, and XL computers.

The pad is smaller than a TV dinner and weighs about as much as a paperback book. You plug the pad into the joystick port of your computer, and you hold it in your hand or lap while you draw, using either your finger or a plastic stylus that comes with the pad.

The KoalaPad comes with the *Micro Illustrator* program from Island Graphics (for the basic price of \$125).

"Growing" Circles And Boxes

The KoalaPad and *Micro Illustrator* are computer popcorn. They're delicious! Once you and your family start using them, you won't be able to stop.

When you boot up the *Micro Illustrator* program, you see a menu of lots of little boxes with words and pictures inside. Each box is a doorway



into new worlds of self-expression for you and your family.

With a KoalaPad and *Micro Illustrator*, all of a sudden making geometric figures is easy. *Micro Illustrator* encourages you to make figures of great beauty and complexity. It's seductive. It's so easy to draw elaborate, symmetrical shapes that you keep thinking: What if? What if I connected these two lines, or what if I created some circles over here? What if I rotated this figure and colored it in?



With *Micro Illustrator*, drawing geometric shapes and figures is easy. The program, which is used with a touch tablet, makes picture creation effortless. This menu screen allows you to choose various brushes and colors.

My family and I have only had the KoalaPad and *Micro Illustrator* for a week, but, already, each of us has used them for several hours apiece.

And we still haven't explored all the features. I love the circle, disc, box, and frame commands. Using these commands you can "grow" geometric shapes in seconds.

Our favorite feature is the mirror. The mirror lets you draw simultaneously in four directions. Combine the mirror command and the line command and you can create glowing rubber-band lines that stretch like a net across the screen. Tack the circle command onto the mirror command and you can draw hosts of rotating circles. In no time at all you can create beautiful patchwork quilts, ornate tiles, bug-eyed aliens, and solar systems full of planets and moons.

The KoalaPad and *Micro Illustrator* are mar-

velous skill and imagination amplifiers. They allow me and my family to do things we could never do on paper. And they make it so effortless that we don't have to concentrate on the mechanical aspect of creating new shapes and pictures. We are free to create and to discover, and when we're finished, we're still fresh enough to be amazed.

The proof of how amazing these products are is how proud we are of what we create. The person on the computer is always calling to the other members of the family: "Come here, everybody! Look what I've drawn! You've got to see this one!"

Mechanical Bach

When I was seven years old, my mother started me on piano lessons. Maybe I wanted to learn about the piano at the time. I really can't remember, because the original joy of making music was quickly submerged by the daily grind of practicing and the weekly pilgrimage to the music studio where I suffered under the harsh tutelage of a nonstop stream of boring and unimaginative music teachers.

The teachers weren't really so bad. It was the method I hated. Like any kid, I had aspirations to create my own music, to make beautiful, original sounds that expressed how I felt and what I thought. But all I ever did was mechanically translate the printed musical notes of mediocre songs from the scores onto the piano keyboard.

I never realized that my teachers weren't treating me like a human being. They were treating me like a machine—a music player, like a player piano. I learned how to read other people's "frozen" music and then miserably try to reproduce it on the piano keyboard. The problem was that I didn't care for the music I was playing, and the sounds I made rarely pleased me. If I liked music (as I did) it was a lot easier to go to a record store and buy a record. Then I could hear the music I liked and it sounded right.

At some level I realized that my original purpose had been perverted. And, like any decent human being, I made a very bad machine. I repeatedly showed up for class late, I never practiced, and I never played a piece the way it was written.

This used to drive piano teachers crazy, and they never lost the opportunity to tell me how little musical talent I had.

I didn't care. I would rather have been playing baseball or touch football. Anything rather than have to practice the G major scale for another half hour.

The Music Construction Set

The Music Construction Set is Will Harvey's response to piano teachers who teach their pupils



to pretend they are machines. Will Harvey is a 16-year-old from Uplands High School in Foster City, California. When asked why he wrote *Music Construction Set*, Will replied: "It was something that needed to be done. I wanted someone who didn't know anything about music to be able to learn it simply and have a lot of fun doing it. I also thought it would be great if you could save what you wrote."

According to Will, his program is "simple, hot, and deep." By this he means that it is easy to use, it appeals to a person's senses, and it can grow with a person. The program is enchanting to musical novices as well as musicologists and musicians.

Music Construction Set (MCS) retails for \$40 and is published by Electronic Arts (2755 Campus Drive, San Mateo, CA 94403, 415/571-7171).

MCS currently runs on the Apple IIe and the Commodore 64 and will soon run on the Atari computers.

If you plan to use MCS on an Apple, you should consider a special offer by Electronic Arts. You can buy a Mockingboard stereo sound card for \$100 (\$25 off the regular price of \$125). The Mockingboard lets you create polyphonic sound on the Apple. That means you can create chords with up to six notes playing at the same time.

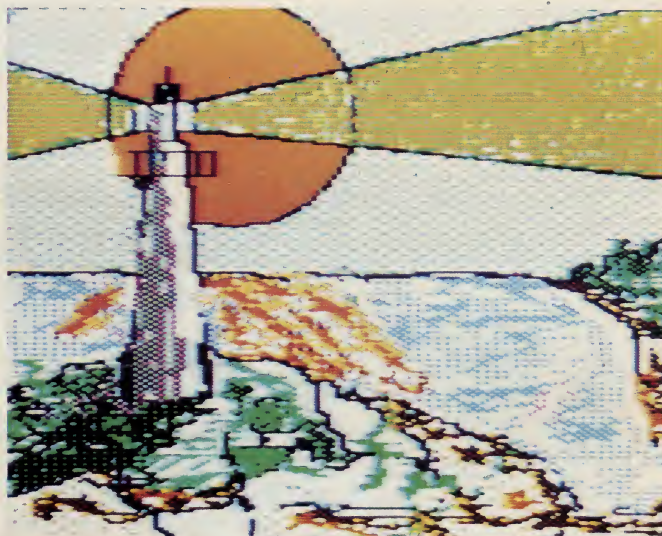
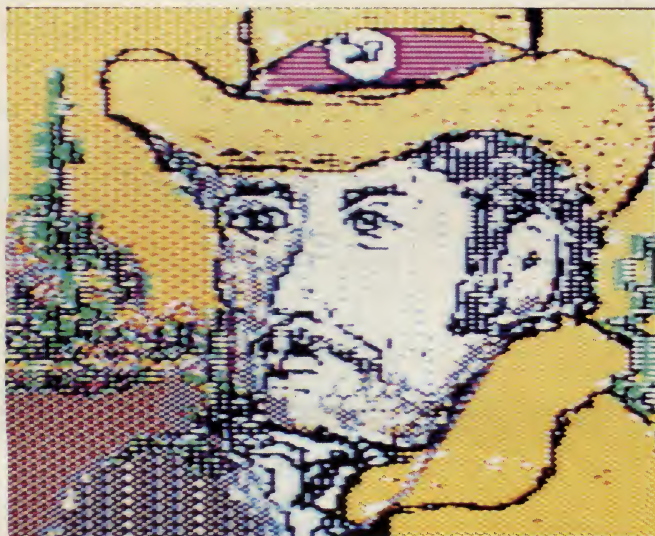
And you get stereo, too. Sweet Micro Systems is at 150 Chestnut Street, Providence, RI 02903 (401/273-5333).

If you have the Commodore 64, you have the SID (sound synthesis) chip, and you don't need the Mockingboard. When you run MCS on the Commodore 64, you will be able to compose and play music with up to three notes playing at a time. On the Atari, you will be able to create music with up to four notes playing at a time.

The other add-on to MCS that I enthusiastically recommend is the KoalaPad from Koala Technologies (see review above). You use the KoalaPad to move the notes and other musical symbols around on the picture screen. You can also move symbols using a joystick or the keyboard. But the *easiest* and *fastest* way to move musical symbols is using the KoalaPad.

This is how MCS works--on the Apple II+ with the Mockingboard and the KoalaPad:

First, you boot up the MCS disk, and you see empty musical staves at the top of the screen and a pictorial menu on the lower half of the screen. If you do nothing, the computer starts playing music itself, as if you have just put a record on your stereo. You hear ten songs, including Pachelbel's "Canon," Rimsky-Korsakov's "Flight of the Bumblebee," and the "Pat the Hat" rag by Douglas



Fulton. Then the music starts again. It will keep playing until you press the RETURN button.

Since you're into creating your own music, you immediately press RETURN. The next thing you do is press the plastic stylus on the KoalaPad down on the pad. Immediately a pointing-hand "icon" appears on the screen. You use the hand to "build" your song.

You move the stylus point across the pad and the hand moves across the screen. When the hand on the screen gets to an eighth note (there are also whole notes, half notes, quarter notes, sixteenth notes, and thirty-second notes), you press the top left-hand button on the KoalaPad. The note "jumps" into the hand. You move the hand onto the empty musical staves and position the note in the E-note position on the treble clef. When you let go of the KoalaPad button, the note falls out of the hand and glues itself to the staff.

You can do all this in just a couple of seconds.

Then you move the hand back to the menu of notes, rests, sharps, flats, ties, octave raisers, and *time signatures*, and pick them up, one at a time, and deposit them on the staves.

When you are finished creating some music—up to 1400 notes and up to 70 measures—you move the hand across the screen to point at the picture of the little house ("Home") and press the KoalaPad button. The musical score on the picture screen *scrolls* to the left, back to the first measure—the beginning of the music. Then you move your hand to point at the picture of the grand piano. You press the button, and the song you just created plays—in stereo.

This is just the beginning.

Cut And Paste

Now that you have created a song, you can play with it. By moving the hand around the screen and pressing the KoalaPad button, you can speed the music up, raise or lower the volume of each speaker, change the type of sound from regular to smooth, to vibrato, to drum-like. With the push of a button, you can transpose the music to other keys and replay the music in each key.

And you can use MCS like a word processor to *cut and paste* measures of music. On the screen is a little pair of scissors and a paste pot. Using them, you can cut up to nine measures out of the beginning part of your song and move them forward or backward in your song.

This is one of the most exciting parts of MCS. As I said earlier, when you play your music, the measures filled with notes scroll by on the picture screen, from right to left. As you listen to the notes you also watch them scroll by. Playing music becomes an effortless experience that is visual as well as auditory. You can concentrate on hearing and seeing the notes, not just playing them. It's a

great joy (to an ex-player piano like myself) not to have to concentrate on stretching your hands and positioning your fingers to get each note right. The computer takes care of these details for you.

Since music now becomes a visual experience, you can begin perceiving patterns visually as well as by sound. And, if you like certain patterns, you can repeat them in the music by using the hand and the scissors to cut the measures in which they appear and "paste" them into other places in the music.

When you are done creating your own music, you can fool around with it. Then you can save it on disk. And, if you have a printer, you can print out a copy of the score.

Poppin' Hot

Now you see why I have trouble sleeping at night. You can see why I go to bed and dream about rainbow-colored rubber bands and dancing musical notes.

Perhaps you can also see why the little voice inside my head so persistently kept telling me to write about "computer popcorn." The KoalaPad, *Micro Illustrator*, and *Music Construction Set* are like popcorn. They are so much fun and taste so good, once you start with them you just can't stop. ©

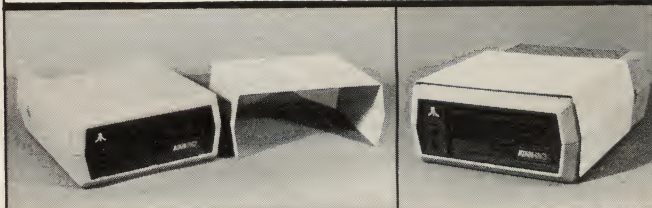
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On The Road With Fred D'Ignazio

The Book Of The Future: Electric, Unending, And Written In RAWM

Recently I went to a book publishers' conference in Baltimore and ran into an editor friend from a major New York publisher. My friend is an avid home computer user, and he edits science fiction books.

He loves to look into his editor's crystal ball, then tell what he sees there. When he looked into the future, he saw computers everywhere. But he didn't see books. He didn't see words, either, just pictures—computer-generated pictures—and sounds. "In the future, all novels, all information, all knowledge," he told me earnestly, "will be conveyed by computers electronically in the form of pictures and sounds."

According to my friend, "Computers can already read books to people automatically, so why should people learn how to read? Reading is becoming an obsolete skill, like speaking Latin."

Human Computers

Was my friend right? After all, look at what computers and calculators have done to people's computing skills. The word *computer* used to mean a person who could do arithmetic calculations swiftly inside his or her head. Most adults today still walk around with little multiplication tables inside their heads, along with a jumble of rules about how to do addition, subtraction, division, and other basic numerical operations.

But we don't use these rules too often anymore. We have slim calculators that fit inside our checkbooks, shirt pockets, and purses. Whenever we have to do any serious computing, we pull out the calculator, punch a couple of buttons, and get the answers we need. Why should we re-

member how to do arithmetic when a tiny electronic brain will remember for us?

Of course, most of us don't make a decision to abandon arithmetic. But, we are abandoning it nevertheless. The less often we practice, the more rusty our skills become, and the rules and tables inside our head begin to fade.

Annex To The Brain

The same thing is happening in our schools. Calculators are becoming as common as pencils and paper in math class. Teachers can rationalize this by explaining how they free their students to examine the concepts and theories behind the numbers. The calculators take care of the numbers, so the students can focus on the axioms, concepts, and rules underlying mathematics.

When a student uses a computer, math ceases to be a painful discipline of mechanically manipulating numbers and formulas. Instead it becomes a beautiful language—a dynamic, active process, a vocabulary of symbols that describe the world. A student doing math on a computer feels like a chemist working in a laboratory creating a bubbling, popping, hissing, odiferous chemical reaction. Math has texture, tangibility, and feel. It is alive and evolving. Young people can explore the world of mathematics using computer-enhanced tools, and they no longer have to get bogged down in a swamp of computational details.

Some writers have gone so far as to claim that calculators and computers are adjuncts to the human brain. The writers' reasoning goes like this: Humans invented electronic computation

machines because the world was getting too complicated for human brains to handle alone. Computers are an extension to the human brain. They amplify the power and speed of the brain in areas where the brain is the slowest and weakest. With the help of an "annexed" computer brain, a human brain can handle vast numbers of details; it can order and structure huge quantities of information, and perform arithmetic at lightning speeds.

Books That Are Hot

Numbers are just symbols. Pictures are symbols, too. So are musical notes. Letters and words, too, are symbols.

Computers are extraordinary symbol handlers. Researchers at several universities recognize this and are starting what are coming to be known as "electronic book" projects. The researchers believe that printed books, the dominant means to transfer information, ideas, and images since the 1500s, will soon be succeeded by electronic books—an amalgam of the personal computer, the TV set, the stereo, and the telephone.

Electronic books must have all of paper books' desirable attributes. Electronic book "players" and cartridges must be inexpensive, portable, and personal.

Electronic-book researchers share the opinion of my editor friend, at least in part. They feel that electronic books of the future can't rely solely on words. Instead they must make use of the full symbol-handling and interactive potential of the computer.

For example, they must be *hot*. According to Marshall McLuhan, a "hot" medium appeals to people's senses, the more senses the better. Electronic books may not have the same texture and smell of printed, paper books. But they will have hot substitutes—animated color cartoons, music, sound effects, and voices.

And they must be interactive. Readers interact with printed, paper books with the use of their memories and imaginations. Readers will interact with electronic books more explicitly—by answering the book's direct questions, by keying in information, by making choices and decisions.

"Participatory" books are on the horizon: participatory textbooks, participatory novels, and interactive mystery stories. The first generation of computer "electronic book" programs already runs on personal computers in the form of educational simulations and electronic adventure games.

Build-Your-Own-Book Kits

Electronic books of the future will be interactive, multimedia entities. But they will also be something more. They will not be static creations whose final form appears when they are first published.

Instead they will be more like "build-it-yourself" book kits—like the new breed of arcade-game builder kits (for example, *Pinball Construction Set* from Electronic Arts and *Loderunner* from Bröderbund). They will be malleable, ongoing, and evolutionary. They will invite modification, polishing, and alteration.

More than 40 years ago, the great American scientist Vannevar Bush came up with an idea called Memex. Memex was to be, in part, an electronic book. It was to be a book that would never be fully written. Each time a person explored new associations, new information, and new knowledge, the book would grow and evolve.

Bush's ideas have been developed even further by Dr. Alan Kay, head scientist at Atari, and Dr. Andries Van Dam, at Brown University, in Providence, Rhode Island. Kay and Van Dam are using modern microelectronics technology to build electronic books in their laboratories.

Already, experimental desktop and lap-sized electronic books exist that include the best features of books and computers. And they are not a "read-only" medium (ROM)—they are a "read-and-write" medium (RAWM). They allow multi-authors. When a book is "published" in silicon, it will have lots of space in its "margins" for readers to make comments and annotations. Some books will even permit copies to be made, and alterations to the original book's content. In a sense, the books will never be completely written. Each new reader can become the book's author and change the book while he or she is reading it.

When readers make changes, they won't be working in only one medium—for example, print. Instead, they will be able to use a "book editor" program to alter all aspects of the book—its text, sound effects, its (static and animated) illustrations, its music, and voices.

The book will be a multimedia creation, and it will evolve in all media.

Mortal Foes

These speculations give little solace to librarians and to other book lovers. Lovers of printed, paper books are not about to jump on the electronic-book bandwagon. They still like bound-and-printed books too much.

Over the last couple of years I have spoken at several librarians' conferences. Many librarians have approached me and expressed the fear that my editor friend's vision of the future may come true.

Actually the librarians have two fears. They are worried that electronic books will supplant printed, paper books. And they are worried that the new computerized books will rely only on pictures and sounds and not on words.

The librarians' fears are well-founded. Paper



is increasingly expensive as a medium for information storage and communication, while silicon is rapidly becoming less expensive. Second, the kind of information that paper can store is limited—chiefly printed symbols, photographs, and illustrations. But the kind of information that can be digitized and stored in silicon is unlimited. Music, voices, photographs, works of art, as well as printed text and other symbols, can all be stored in a silicon book. Then they can be altered, copied, and instantly transferred across thousands of miles and made available to other human beings at only a small cost.

This has the librarians worried. If words are no longer the dominant, or even most important, medium of human communication, reading and writing may become obsolete skills, just like calculating numbers, and speaking and writing Latin.

Librarians and other book lovers are not going to just sit back and watch this happen. They see themselves as caretakers, guardians, and protectors of books—of printed media, in general. They feel that a gigantic battle is looming on the horizon between printed media, on one hand, and non-print, electronic media, on the other. Books and computers, they feel, are mortal foes that will soon be locked in battle.

And when the battle is over, only one foe will remain—the computer. Books already published will yellow and crumble, destroyed by the acid in their pages, and no new paper books will ever again be published.

With the emergence of the electronic book, the era of the printed, paper book may soon be over.

The Rise Of The Electronic Librarian

The gradual move from paper to silicon is inevitable. But it is not going to happen overnight. Nor

does it have to mean the end of books, the end of words, or the end of librarians.

Recently I gave a speech at the annual convention of the Virginia Educational Media Association (VEMA), at Virginia Beach, Virginia. The title of my speech was "The Role of the Librarian in Helping Students, Parents, and Teachers Use Computers and Robots."

In my speech I expressed the hope that librarians would see themselves in a broader role. Librarians are not just caretakers of books and magazines. Rather, they are guardians of information, knowledge, wisdom, stories, tales, lives, art, music, and culture. They are the caretakers of civilization. How civilization is stored is not important as long as it is protected and readily accessible to all people.

Many librarians now call themselves *media specialists*: They are the guardians of the media on which civilization is stored—all media. They make it possible for children and adults to access civilization through those media.

As the 20th century comes to an end, it is a fact that more and more of our civilization is being digitized and stored on electronic media. This does not mean that librarians must be trained technologists and engineers. Nor does it mean they must become computer programmers, electronic technicians, and videodisc mechanics.

They just have to be able to use the new machines, because they are the doorways, the windows to the information. And they must be able to help others use these machines. As the bulk of our civilization shifts into an electronic format, it is up to the librarians to keep the doorways and windows open for the rest of us.

I have listed below some of the computer- and robot-related services that librarians can provide. I have suggested a pathway librarians can follow to create an electronic library of the future.

In my vision of the future, books, words, and librarians have a very important role to play.

The Armchair Computer

Most adults are not ready to approach computers. And most children have only a limited opportunity to spend time with computers. By mid-1984, even though all elementary and secondary schools in the U.S. will have at least one computer, each student will be able to spend only 15 minutes with a computer per week.

Yet many children and many adults want to learn more about computers. How can they learn more?

They can start by reading magazines and books. Children and adults can become armchair computer experts by reading the many excellent beginners' books and magazines about computers. The books and magazines will make the time a beginner spends on the computer more productive and exciting.

Computer Etiquette

Books and other print materials can also teach people how to use computers ethically. Computer literacy courses sometimes focus exclusively on a narrow skill such as BASIC programming and little attention is devoted to such pressing social issues as software piracy, computers and alienation, and computer crime. Good books and magazine articles can focus on these issues and broaden the scope of children's and adults' computer literacy.

Software Evaluation

Hundreds of computer programs and dozens of new computers have appeared in the last couple of years. Children and adults who are interested in computers are bewildered by all the choices open to them.

Libraries can perform a major public service by acquiring good software and hardware review materials published by such organizations as:

EPIE Institute

Box 620
Stony Brook, NY 11790
516/246-8664

School & Home Courseware Inc.

Dept. 750
1341 Bulldog Lane
Fresno, CA 93710
209/227-4341

The Micro Center

Dept. M G
P.O. Box 6
Pleasantville, NY 10570
800/431-2434
914/769-6002

K-12 MicroMedia

172 Broadway, Dept. D
Woodcliff Lake, NJ 07675
201/391-7555

Jack L. Hartman & Co.

2840 Peters Creek Road
Roanoke, VA 24019
703/362-1891
800/336-5962

Computers On TV

There are more and more computer programs on television—on network TV, cable TV, and public television. Librarians can contact the local TV station to find when computer programs will be aired. Then they can ask permission to videotape programs for use in the library. Programs can be used as part of classroom assignments on computers, by computer clubs, parent-teacher groups, and for in-service training of school faculty and administrators. Or the librarian could tape several programs and organize a unit during library period on the "electronic library of the future—the pros and cons."

Public TV, in particular, has a number of excellent programs on computers. One program I have participated in is the Educational Computing Profile, a monthly, half-hour, magazine-format show produced by Kentucky Educational Television, in Lexington, Kentucky. Every month the show is sent, via satellite, to public TV stations all over the country on the Public Broadcasting System (PBS). To find out more about the show, contact:

Luralyn Lahr

Associate Producer
KET Network Center
600 Cooper Drive
Lexington, KY 40502
606/233-3000

The Educational Computing Profile shows are cosponsored by EPIE (Educational Products Information Exchange) and Consumers Union.

A Software Library

Many librarians are creating a computer-and-robots section for their libraries. The section has print materials focusing on robotics, programming, computer literacy, computer ethics, computers and society, and software and hardware evaluations. It also has a growing selection of personal computers and computer *software*. Children and their parents can check out the software and use it in the library or at home. Teachers can check out the software and use it in their classes. Each software package comes in an envelope with a photocopy of one or more recent reviews and evaluations.

Almost all librarians can use more help. Many librarians are "adopting" robot mascots. A robot can act as a librarian's assistant and "public relations agent."

Robots are extremely powerful attention-getters.

A mobile robot can roll around the room carrying a sign or wearing a billboard advertising the library's new books or attracting the kids' attention to the librarian's messages and new services.

Children can design a musical language for the robot, and teach it library manners.

A robot makes a terrific librarian's assistant, and it is one of the less expensive computer peripherals. Robots like the Tiny Turtle from Harvard Associates and FRED and TOPO from Androbot are less than \$500. (FRED is only \$200.) For more information, write or call:

101 East Daggett Drive
San Jose, CA 95134
408/262-8676

260 Beacon Street
Somerville, MA 02143
617/492-0660

Everyone is pressing children and adults to become computer literate, but before anyone can truly become computer literate, they must first become computer *intimate*. To be computer intimate they don't need to know how the computer works, only how to make it work. They must be comfortable and relaxed with the computer and be able to use it to work, learn, or play.

Most people first use computers in a class or on the job. Thus, they must learn something serious or work-related.

But a computer in a library is different. It is there as a resource, a tool, a thoughtful, challenging game, and *as a way to spend one's time learning about things one wants to learn about.*

A library is a place where a person can become intimate with computers.

Librarians should look for computer programs which are attractive, easy and enjoyable to use, and which children and adults can use for hobbies, supplementary, self-motivated and self-guided learning, and for personal enrichment.

The library computer can become each person's personal learning companion and tutor.

Libraries can also buy computer programs that turn the computer into a general-purpose tool to help students with class assignments and

homework. The computer can have a word processing program so students can work on book reports in the library. It can have graphics and music "builder kits" to help kids with art and music assignments. Children and adults can use data management, listmaker, calendar, and time management programs as electronic notebooks and to schedule and prepare assignments. New computer math tools help children with math classes in arithmetic, geometry, algebra, and trigonometry.

Libraries can also work with parents in the community to get donations of old computers, programs, and computer equipment. Everything can be cataloged, then loaned to low-income families in the community who are interested in computers but unable to afford them.

Computer And Robot Activities

Older students can program the library robot to become a tutor for younger children. The robot can teach directionality, counting, letters of the alphabet, spelling, colors, and other basic kinds of knowledge and skills.

Older students can form a library software department and write software to help the library—especially learning programs for different classes in school, and programs that maintain an electronic data base of computer and robot resources available at the library. Librarians should especially encourage team programming projects where groups of students work together.

Students can be encouraged to use the library computers to create their own electronic "choose your own adventure" stories. The program listings for the stories can be printed out and bound by the art classes and put on a special bookshelf in the library. The stories should be public domain so that students can copy the original stories, add to them, change them, and make them into new stories. The stories can become ongoing, evolving electronic books.

The Electronic Library

Each personal computer in the library should have a modem or acoustic coupler attached. This device lets the library computer talk to electronic data banks and information services via the telephone. These services are an electronic "annex" to the library.

Most information services are easy to use and relatively inexpensive. There is no need to organize elaborate, formal projects around these services at first. It is very educational for librarians and child and adult patrons to "browse" through these services and the information they offer. After everyone becomes comfortable using the electronic library, activities and uses will suggest themselves naturally.

Watch Me!

Perhaps the greatest justification for having computers and robots in libraries is so the librarians can learn more about these devices—in the manner they choose and at their own pace. They can control and regulate the influx of new technology rather than be overwhelmed by it.

The best way for librarians to become comfortable with the new technology is for them to look over the shoulders of the children who are teaching the robot and computers new tricks. They'll pick up the children's love and enthusiasm for these machines quickly, and they'll find themselves learning how robots and computers work. Pretty soon they'll be dreaming up new projects for the computers and thinking about adopting a second robot.

As more and more of our knowledge, information, stories, and culture are converted to an electronic format, it will be up to the librarian to acquire the machines and the expertise to give everyone access. These machines and the librarian's expertise are the windows and doorways to the information people need. The librarian's job is to be there to make sure that the windows and doorways are open wide so that the riches stored inside these machines are available to everyone. ©

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Sunnyvale, CA 94086, (408) 866-8579

THE WORLD INSIDE THE COMPUTER

New Directions For Computer Camps

Fred D'Ignazio, Associate Editor



I thought that this camp would be about programming. I didn't know that it would be so much fun!

Ashley Bell, age 8

Ashley was one of the youngest campers at the Computer FUN-

damentals camp at Hollins College, in Roanoke, Virginia, last summer. Her comments reflect the kind of computer activities she participated in at the camp. However, if she had gone to another camp, she might have learned about computers in a completely different way.

The Changing Face Of Computer Camps

Most educators agree that the first computer camp was organized by Dr. Michael Zabinski in Connecticut, in 1978. Now, six years later, Zabinski's organization offers five camps annually, in locations from Simsbury, Connecticut, to Portland, Oregon. In addition to Zabinski's camps there are hundreds of other computer camps throughout the U.S.

The first camps were mostly attended by boys. The boys studied "hard-core" computer subjects like BASIC programming, computer hardware, and hooking up different devices to computers. Compared to today's models, the

Fred D'Ignazio is a computer enthusiast and author of several books on computers for young people. His books include Katie and the Computer (Creative Computing), Chip Mitchell: The Case of the Stolen Computer Brains (Dutton/Lodestar), The Star Wars Question and Answer Book About Computers (Random House), and How To Get Intimate With Your Computer (A 10-Step Plan To Conquer Computer Anxiety) (McGraw-Hill).

As the father of two young children, Fred has become concerned with introducing the computer to children as a wonderful tool rather than as a forbidding electronic device. His column appears monthly in COMPUTE!.

computers at the first camps were primitive. They consisted of early Apple computers, TRS-80 (Model I's), Commodore PETs, and other computers whose names we have all but forgotten.

Today's campers enter a new world filled with the latest personal computers and peripheral devices such as speech synthesizers, graphics pads, light pens, and robots. They study a variety of subjects, including the impact of computers on society, computers for handicapped people, and computers in the arts and humanities.

Today, girls represent a much larger proportion of the campers. In some camps, they number as many as a third.

At most camps you will also see a few campers who have some sort of mental or physical disability. Campers in wheelchairs are a common sight at many camps.

So are adults. The newest computer camps cater to both youngsters and oldsters. In fact, it's predicted that many of the most avid campers in 1984 will be men and women in their 60s and 70s.

How To Choose A Computer Camp

There are hundreds of computer camps to choose from, each with its own philosophy and personality. And you can find the right one for you, if you look hard enough.

The first thing you should look at is the type of camp. Is it sponsored locally or nationally? Is it for children, adults, or both? Do the counselors concentrate on programming or on computer literacy and applications? Is the camp residential or a day camp?

There are benefits and drawbacks associated with each type of camp. For example, if a camp is locally sponsored, it may be more suited to the needs of the people in your community. But local sponsorship doesn't necessarily mean high-quality sponsorship. Generally speaking, the best local computer camps are affiliated with a community college or university.

Residential computer camps are nice because they take the children away from home for a week

or two of fun, physical exercise, and computer instruction. But some educators feel that residential camps are a fad. Their outdoor activities are often an afterthought, and the camps cannot compare, in terms of staff, program, or facilities, to the regular summer camps, which, on their own, are beginning to offer computer activities. Also, residential camps are expensive and relatively inefficient if your main goal is to introduce your child to computers.



Campers draw on each other's skills and interests to program a computer. Courtesy of Computer FUNdamentals Camp. (Photo by Walker Healy, Jr.)

In the past, most computer camps were for kids. Now adult camps are springing up all over the country.

Many families send their kids to computer camp so they can come back and tell the family which computer to buy. But why let your kids have all the fun? Why not attend computer camp at the same time as your son or daughter? Then you and your kids can decide together which computer is right for the family.

New "mixed-age" camp classes are springing up that include people of all ages. Being in a class with several bright youngsters can be unnerving, but it can also add a new dimension to your computing. Kids approach computers as *explorers*. By imitating them you can begin computing fearlessly and playfully.

The Need For Continuing Support

The best computer camps offer a balanced approach—some computer programming and some computer activities. But beware. If you get your child started in either side of computing, his or her appetite for more computing is liable to increase. When you look for a computer camp you should try to find one that will be around to satisfy your and your child's computing interests no matter how sophisticated they become.

Dr. Zabinski, for example, believes that com-

puter camps "breed kids who are sophisticated with computers, so they can't just drop them." His camps emphasize programming as opposed to computer activities. "We train the youngsters in computers, so it is our responsibility to be around when they become more sophisticated and need more advanced training."

Zabinski's philosophy is "to motivate kids and excite them with examples they can relate to and identify with." His camps have been so popular and successful that he and his staff have to revamp their curriculum each year just to keep up with the kids they trained the previous year.

According to Zabinski, "We used to be content teaching kids to program in BASIC and Pascal. Now I feel that teaching new programming languages is just moving sideways. We can't afford to move sideways. Kids can master new languages in just a couple of weeks. Our objective in 1984 is to teach kids how to interface computers with each other and how to interface computers with other machines. We'll teach kids how to create their own computer languages, and how to use modems and bulletin boards and get computers communicating over the telephone."

Zabinski emphasizes that his highly technical curriculum is not aimed at just teenagers and older children. "Take nine-year-olds," he says. "Nine and ten-year-olds are not what they used to be. We have one nine-year-old who learned Assembler and won a national Assembler Language contest on the TRS-80 computer."

"There are plenty of sophisticated kids at all ages," contends Zabinski. "Computer camps are often these kids' only outlet. We've helped to create these kids, so we have to be ready when they come back to us each year. We can't abandon them."

Computer FUNdamentals

Nancy Healy and Dr. Barbara Kurshan run the Computer FUNdamentals Camp at Hollins College, in Roanoke, Virginia. Kurshan and Healy agree with Zabinski that computer camps need to keep upgrading their curriculum to keep up with the newest computers and the increasing sophistication of the average camper. But Kurshan and Healy stress computer applications as opposed to computer programming. And, above all, they want their campers to have fun.

According to Healy, "What makes our camp different is that it is oriented toward fun, and, at the same time, the kids become good computer users. Also, we don't mix physical activities and computer instruction. This lets our handicapped campers do everything that all the other kids do."

"Another reason our camp is different," Healy continues, "is that our camp isn't just for math and science freaks. Kids who love music

and the arts are equally interested and involved.

"After the first few days at camp, it is easy to see who knows what. The 'knowers' are those who attract people around them. But the great thing is that each child brings a different skill with him, like typing, music, art, programming, or math. The kids work together and draw on each other's skills and interests. That way everybody gets a chance to shine."

The Computer That Ate Manhattan

Like their counterparts at other camps, computer campers at Hollins spent most of their time last summer using real computers as electronic notebooks, typewriters, telephones, libraries, and mailboxes. But camp counselors also encouraged the children to spend time inventing totally new fantasy computers. Children described these computers and what things they could do. One boy, for example, made up a story about a computer that ate Manhattan.

One of the big projects during the camp was for the children to build their own *junk computers*. The children designed and built the junk computers out of all kinds of things, including buttons, wires, beads, tupperware, TV sets, and aluminum foil. One boy built a computer out of a nonworking TV set and a working walkie-talkie. The boy hid the walkie-talkie inside the TV set. Another boy built a junk computer that played beach music. The cardboard computer had a tape recorder hidden inside.

A local elementary school PTA in Roanoke sent two children to the camp on scholarships. The children were to learn as much as possible about computers during camp so they could help their teachers use the school's two new computers the following fall. The children, one 10 and the other 11, were chosen on the basis of an essay on why they wanted to go to computer camp. They wrote down everything they learned at camp in a spiral notebook, and were among the camp's most conscientious students.

Training A Future Sally Ride

While the camp was in progress at Hollins, America was glued to the TV set watching its first female astronaut, Sally Ride, blast off the earth in the Space Shuttle. This inspired the kids to create a computer-controlled rocket launching at camp.

The rocket was finally launched on the same day that Sally and her teammates brought the real Shuttle back to the earth. It even featured a computer-screen simulation of the rocket taking off and a speech synthesizer, in robot nasal monotone, doing the countdown: 5 ... 4 ... 3 ... 2 ... 1 ... IGNITION!

In honor of Sally Ride, the girl campers got to operate the computer to control the rocket launch.



Computer mania at the National Computer Camps. Courtesy of National Computer Camps. (Photo by Walker Healy, Jr.)

And the local TV station in Roanoke was so excited by this project that they filmed the rocket launch and, on the evening news, mixed the tape with a film of the real Space Shuttle take-off.

Computer Camp Resources

If you're interested in learning more about computer camps, you might want to send for *The Computer Camp Book*. It's a complete guide to computer camps and features a national directory of computer camps. The book is available for \$12.95 from

The Computer Camp Book
P.O. Box 292
Yellow Springs, OH 45387

For an additional \$4, you can get a copy of an updated directory of computer camps.

Two of the leading computer camps in the U.S. are the Atari Computer Camps and the National Computer Camps. You can learn more about them by writing:

Dr. Linda Gordon
Atari Computer Camps
Dept. AL
40 E. 34th Street
New York, NY 10012

Dr. Michael Zabinski,
Director
National Computer Camps
P.O. Box 585
Orange, CT 06477

You can learn more about the Hollins College Computer FUNDamentals Camp by writing:

Dr. Barbara Kurshan
Nancy Healy
Computer FUNDamentals Camp
Hollins College
Hollins, VA 24020

To find out more about the Hollins camp's robot mascot, you can write:

Bill Glass
TASMAN TURTLE & TURTLE TOT
Harvard Associates, Inc.
260 Beacon Street
Somerville, MA 02143

The Morning After: Anti-Computer Backlash And The Arrival Of The Mass-Market Home Computer Part 1

This is the text of the speech Fred delivered at the West Coast Computer Faire in late March. We are printing the speech in two parts.

We are at a watershed in home computing. The watershed has been caused by the computer price wars of 1983, the introduction of simple and inexpensive, yet powerful, new computer programs and peripherals, and the entry of IBM into the home computer market.

Over the next year, home computing users, vendors, and enthusiasts will divide into two major camps: the *computer intimates* and the *computer literates*. By the end of 1986 these two groups will have fused into a third camp: the *neo-programmers*, who will represent the bulk of the users of home computers through the next decade.

Literates Vs. Intimates

Hackers, computer professionals, old-line computer educators, programming teenagers, and computer hobbyists will make up the bulk of computer *literates*. Computer literates will stress the importance of learning how to program and learning how computers work. The computer itself will continue to be the prime concern of this group.

Computer *intimates* will far outnumber the computer literates. Computer intimates will consist of all the millions of Americans who were roped or forced into using computers and who demand

that they be easier to use and more practical.

Computer intimates will believe that software and computer input devices are far more important than the computer itself. As a group they will preach ignorance of computer programming and ignorance of the computer's insides as virtues. The motto of the computer intimates will be: "You don't have to know how a computer works, only how to make it do work for *you*."

The Computer Freight Train

On December 6, 1983, I appeared on ABC's *Good Morning America* TV show as a computer expert. My task was to advise families on the type of computer they should purchase for Christmas. In less than seven and a half minutes I led the show's viewers and its two hosts, David Hartman and Joan Lunden, through a bewildering array of computer hardware and computer programs.

I am sure that when the segment was over, most viewers still couldn't tell the difference between a disk drive, a program recorder, or a touch pad. But I'll wager that they did have a better feeling for the risk involved in investing in a personal computer, for the daunting complexity of becoming a first-time user, and for the flood of computer products and the dearth of reliable guidelines for making a purchase.

"Most consumers see personal computers as a high-speed freight train," I told viewers. "They feel they have to take the risk of hopping on now,

or they feel they will be run over or left behind."

The Hottest Thing Under The Christmas Tree

More computers were sold as Christmas gifts this year than in any year prior to 1983. By early 1984 over eight million Americans had personal computers.

Unfortunately, soon after Christmas, many of these Americans began suffering from "morn-ing after" regrets and resentments. Too many Americans who had seen the slick commercials on TV and who had heard the daily press reports about the computer revolution were now wondering what they had gotten themselves into.

Most Americans have heard the word *software* but have only a vague idea what the word means. They have no understanding of what comprises a "complete" computer system. They have no ap-preciation of what operating or programming a computer entails.

Most Americans don't even know how to hook up a computer's cables, plug it in, or turn it off. I know of one family who finally turned their computer off at one in the morning, but who only did so after hours of agonized, fruitless searching of the manual. They were afraid they might break the computer if they turned it off the wrong way.

The Computer Kit

Why do people buy computers? Most Americans buy computers out of curiosity, for their work, to play games, or as an educational aid and tool for their children.

Most Americans buy computers at bargain-basement prices, usually at discount houses. Most Americans get their basic knowledge about com-puters from news stories and TV commercials.

When a person buys a computer, he thinks he has bought something equivalent to what he has seen on TV. He expects his computer to be able to do roughly the same things as the TV computer.

The average new-computer purchaser brings his computer home, struggles with the manuals, cables, and plugs, and finally powers the com-puter up. After all this effort, what does he get?

A blank screen.

After still more struggling with his manual, the astute newcomer finally realizes that what he has bought is a *kit*—like a bicycle or a puzzle that comes in a million pieces. Only it's worse. The kit's pieces are invisible. You don't get to see them until they appear on the computer's display screen after you have typed them in at the keyboard.

The pieces, of course, are the commands in the computer's BASIC programming language. Computer commands are more difficult to use than puzzle pieces for two reasons. First, puzzle

pieces are combined in some sort of visual order to make up a picture. Second, pieces in a puzzle can usually be combined in only one way. And the picture fragment on each piece is a clue to where the piece belongs.

But computer commands are different. They carry no picture fragment that helps you see where in a picture (or a program) they belong. And they can be combined in an infinite number of ways. There is no set order to reach any given solution.

Most kits—for a bicycle, a lawn chair, a toaster oven, a sandbox, or swing set—come with explicit, printed directions. Computer kits don't usually come with printed directions. Instead, they come with a *dictionary* of commands organized, alpha-betically, from A to Z. You get all the building blocks, but little or no help in how to put them together. And, before long, you realize, with a sinking feeling, that they can be put together in a million ways.

But where do you start?

Buying Half A Computer

It finally dawns on the consumer that what he has bought is only *half a computer*. Until he buys some software and some more equipment—a program recorder or disk drive, cassettes, disks, cartridges, and a printer—he can't do anything useful.

Of course this isn't exactly true. He can always assemble the kit himself. There are dozens of magazines and hundreds of books with pre-recorded programs for his kind of computer. All he has to do is follow the blueprints—the listings—in the books and magazines, and soon he will be the proud owner of a real computer.

Of course he will need to spend dozens of hours entering in the programs, and dozens of hours more poring over the listings, trying to figure out why his programs don't work.

And he will have to invest in a storage device, so he can save his delicate, precious programs.

And he still needs a printer if he plans to use the computer as an electronic typewriter, book-keeper, or filing cabinet, the three most popular home computer applications.

Voting No To The Home Computer

After the average consumer has forked over from \$50 to \$300, is he likely to invest another \$100 to \$1000 for additional hardware and software to "finish off" his computer?

After the consumer has made his purchase and found that he has only half a computer, is he likely to feel positively toward computers and computer companies?

After the average consumer has realized that he has bought a kit, is he likely to roll up his sleeves, master a programming language, or pa-

tiently enter in hundreds of lines of unintelligible commands?

The answer to all these questions, *for the average consumer*, is no.

The After-Christmas Backlash

Under these circumstances, the average person who bought or received a computer for Christmas is not likely to become a computer enthusiast. Instead, he is likely to become part of a growing anticomputer backlash.

More and more individuals and groups in society are coming to the conclusion that personal computers have not lived up to their promise. At the very least, they have not lived up to their commercials.

These individuals and groups are becoming more organized and outspoken. Like me, they see personal computers as a high-speed freight train, and they are set on derailing that train.

The other night I was listening to National Public Radio's "All Things Considered." A so-called computer expert was on the show decrying the use of computers in education. In his opinion, most people were using computers as fancy, expensive, electronic flash cards. He warned American parents and teachers that the computer industry was deceiving them in a major way.

Two nights later I read in *USA Today* that the American Academy of Pediatrics was warning against using computers with small children. The Academy reaffirmed its decade-old statement that "Advertising that promotes ... learning environments, programs, or systems is often guilt-producing, misleading and potentially destructive of human development and values." The Academy scolded parents who create a "superbaby syndrome" in which parents buy computers for small children and enroll them in computer classes even before they are toilet-trained.

Fighting Back

The American public has been dazzled by the glamour and high-tech chic of personal computers. On the surface, the public's attitude toward computers seems to have undergone a dramatic change. On the surface, it appears that most Americans approve of computers, if not for themselves, at least for their children. And even if they don't approve of them, they see them as inevitable.

This is, indeed, how Americans feel—on the surface. But what is going on beneath the surface?

I submit that the public's current attitude toward computers is superficial and can easily be changed. I further submit that the situation is becoming increasingly ripe for public opinion to take a swing in the opposite direction. This swing may be dramatic and quick.

The American public has been put on the defensive by the rapid spread of personal computers. But the public is likely to regain the offensive at the first opportunity. Beneath the thin veneer of approval lurk people's old prejudices and stereotypes against computers. These prejudices and stereotypes are fortified and aggravated by the bad experiences millions of people are having, firsthand, with computers.

The American public just needs a champion. As soon as groups and individuals appear who can articulate the public's feelings against computers, the public will rally around them. And then a major backlash against computers will begin.

A Consumer Uprising

People who are alienated by computers are not ignorant Luddites who oppose computers just because they are new and different.

Many people already oppose computers out of ignorance and prejudice. But many more may soon oppose computers because they feel computers have been misrepresented and oversold.

An anticomputer backlash may be in the cards. If so, it should not be viewed by those of us in the computer industry as an ignorant neo-Luddite rebellion. We should see it for what it is: a legitimate uprising by irate, unhappy consumers.

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The Morning After: Anti-Computer Backlash And The Arrival Of The Mass-Market Home Computer Part 2

In this month's column, we conclude the text of Fred's speech at the West Coast Computer Faire. Part 1 appeared last month.

A Failure To Explain Computers

What could make computers go out of style?
What could make the market for home computers dry up?

First, the personal computing revolution is already nine years old, yet the revolution's leaders (computing educators, manufacturers, authors, journalists, and spokespersons) have still not succeeded in explaining computers to the average person. Underneath the surface, the average person remains just as fearful, just as ignorant of computers as he was nine years ago.

Second, the computer industry has persisted in focusing on hardware and high technology instead of on human beings and human needs. Computers and computer programs have evolved based on their own logic and strengths rather than on human nature and human psychology. Most of the industry's imagination has gone into making the computer a gaudy "show-off" machine rather than on tailoring the computer to average human beings who want only to think like human beings, work like human beings, and have fun like human beings, *and not like computers*.

We need a new generation of computer programs which reflect the workings of the human mind. We have had enough computer programs that put human minds on the rack and try to squeeze them and stretch them to become more computerlike.

A Wellspring Of Resentment

Last, the computer industry, in its well-founded enthusiasm and zeal, has not been completely honest. Advanced computer applications are shown regularly on TV commercials. The average consumer sees these commercials, so he thinks that his \$50 computer will be able to do something similar. His expectation, of course, is absurd. But it is creating a huge wellspring of resentment and disappointment among disgruntled consumers who discover that their low-cost home computer cannot perform the miracles that computers in TV ads commonly perform.

Educational Advertisements

Manufacturers should respond quickly and directly to this growing consumer backlash to computers by beginning a series of educational advertisements on TV and in the other media. For purely commercial reasons, these computer ads should be carefully designed, ongoing tutorials on the fundamentals of computing.

Manufacturers can begin their campaign by showing bare-bones computers. They can explain that low-cost computers are "kits" that require lots of time, effort, and money before they can do anything useful.

In later ads manufacturers can take consumers by the hand and show them how they can put their kits together, how they can "grow" their kits into full-fledged computers, and how they can buy full-fledged computer *systems* outright.

Preventing A Consumer Backlash

To prevent a consumer backlash against com-

puters, manufacturers need to advertise computers honestly; they need to start educating the average consumer. In addition, they need to admit that computer software is far more important than hardware. The simplest, most ugly computer can be a better buy than an advanced computer if it comes with good, easy-to-use software.

In addition, manufacturers need to design new computers that are more suitable for the average consumer. Low-cost, bare-bones computers should still be offered. They meet the needs of people and groups who operate on a tight budget. And they are perfect programming laboratories for young people who will become our next generation of software inventors, engineers, designers, artists, and entertainers.

However, manufacturers should also offer higher-priced computer *systems* that come completely bundled with hardware and software. The entry-level computer system should come with at least 256K of memory (for powerful yet simple software), a built-in modem, a disk drive, and a printer. And it should come, at minimum, with a library of software, including a word processor, an electronic notebook, a file cabinet, communications software (a post-office, mailbox, library, telephone program), a spreadsheet program, and a calendar-scheduler program.

Computer systems should also come with a program (like "Apple Presents Apple") that lets the computer introduce itself. And every program on the computer should have the responsibility to teach the new user how it (the program) works.

The First Mass-Market Computer

Into this rapidly evolving market comes the IBM PCjr. This computer arrives at a fateful time. It may well become the catalyst for a new generation of mass-market home computers.

According to many industry experts, the PCjr is something of a disappointment as a computer. *But this is absolutely inconsequential!* From the looks of things, the PCjr will probably still emerge as the standard in the home computer market the way its big sister, the PC, has emerged as the standard in the business market.

The PCjr is attracting third-party software and equipment

the way the Apple computer did before it. But there is an important difference: The industry has grown and matured enormously since the introduction of the original Apple computer.

What does this mean? It means that third-party support for the PCjr is materializing much faster than it did for the Apple. It means that, within a year to 18 months, there will be a vast supply of equipment and software for the PCjr. It means that the quality of this equipment and software will be as advanced as anything that is on the market. The guidelines for the best new computer products are *low cost, productivity, friendliness, and simplicity*. The products for the PCjr that incorporate these features will be a better buy than older products for home and business computers, products that probably cost hundreds of dollars more.

All these developments will totally transform the PCjr. Within a year after its introduction, the basic PCjr computer will cease to be of any consequence. Instead, all that will matter will be:

- The quality and variety of its third-party software.
- The quality and variety of its third-party equipment.
- The IBM name and reputation for stability and excellence.



- IBM marketing, technical support, handling, and service.

Splitting Into Two Markets

The PCjr, *as a galaxy of hardware, software, and equipment*, will reflect the emerging sophistication of the American consumer. If it is marketed honestly, it may play a major role in educating the American consumer and in combating anticomputer backlash.

The PCjr should be sold at two levels. The less expensive model will appeal to people on a tight budget, to schools and budding computer inventors, and to the computer literates. It is a computer "kit" for people who want to learn more about how computers work or who have to do their computing on a shoestring.

The more expensive model will become the preferred computer of the computer intimates. Computer intimates will choose their computer the way they buy their home stereo. They will purchase the complete computer with all its components and with a library of record albums (software). They will want to take the computer home, plug it in, and let it become the heart of a family work station, communications network, and entertainment center.

A New, Expensive Standard

By mid-1985 the Japanese will be ready to follow IBM into the U.S. home computer market. By then the market will have consolidated, matured, and stabilized to the point where the risk of entering the market will be small and the rewards will be immense.

By mid-1985 a full-blown PCjr, with supporting third-party equipment and a library of software, may well have emerged as the home computer industry standard. But it will be an expensive standard, thus severely limiting the market size.

This is where the Japanese come in with their proven ability to market high-quality, high-technology products at a mass-market price. The Japanese will offer the lower-priced computer "kits," but they will concentrate on mass-marketing complete systems at only a fraction of the price of the PCjr and its clones and look-alikes.

As a result of the entry of IBM, and later the Japanese, by 1986 computers for the first time may become a truly low-cost, mass-market home appliance. Christmas 1986 will be like Christmas 1983, but with Americans buying millions of bundled home computer *systems*.

Software At The 7-11

The biggest revolution over the next three years will not be in home-computing computer hardware or software. It will be in software *distribution*.

Today the computer software industry is a

dwarf about to become a giant.

Until now, the software industry's offerings have been narrow, primitive, and far too expensive for mass-market merchandising. The problem has been the medium on which the software is distributed—cassettes, diskettes, or ROM cartridges. The medium was either cheap but slow and inappropriate for large programs (tapes), or fast but too expensive and too limited in memory (cartridges), or fast and spacious but expensive (diskettes).

There are more than 35,000 computer programs on the market, stored on a tape, cartridge, or diskette. But buyers can afford to buy only a few programs apiece because of their high cost, and because there has been no way to evaluate or preview the programs. At the same time, retailers are reluctant to stock a large number of programs because program packages are bulky, and programs have a limited shelf life. (Like records and books, they stay "hot" for only a short time.) The retailers are afraid of acquiring a big inventory of programs that aren't moving.

But the software industry is on the verge of changing—suddenly and explosively. Software manufacturers have now found an amazing shortcut—a new way to distribute their products. Over the next year they will begin distributing software *electronically*. This one change will enable the industry to quadruple itself in under a year's time.

How will software manufacturers manage this miracle?

New *software kiosks* will soon be popping up in all sorts of places, including department stores, stereo stores, toy stores, computer stores, discount stores, and even 7-11s, drugstores, and videogame arcades. The kiosks will feature computer terminals that are capable of running thousands of piped-in programs on all subjects and for all major computers. A powerful "expert system" will guide the average consumer through the myriad choices and help him decide on his next software purchase.

When the consumer is ready to purchase a program, he will place a disk into a slot on the terminal. He will have purchased the disk for about \$10. A moment later, software for *his* home computer will be beamed over a telephone link from a mainframe computer to the store's terminal and stored on his disk. He will pay the machine, vending machine style, with a credit card, or make his purchase as he leaves the store. The software itself will cost him only a nominal price—from \$5 to \$10.

The real savings comes to the consumer (and the real meaning of the revolution emerges) the next time he wants to buy a new program. He returns to the kiosk, picks out a new program, *and has to pay a total of only \$5 or \$10*. The computer

automatically erases his old program from the disk and replaces it with the new program.

Piping in new programs electronically and reducing the cost of individual programs will turn software into an overnight mass-market industry. And software, of course, must be run on computers.

However, when the electronic distribution of software cranks into high gear, computers themselves will quickly sink into obscurity. The computer industry will become like the record industry, with the real focus not on the hardware but on the software.

In the record industry, the focus is on the hot new *songs*. In the computer industry, the focus will be on the hot new *programs*. Because of their instantaneous, low-cost availability, new programs will be in great demand. The average person will be able to acquire programs almost on a whim, and he or she will be anxiously awaiting all the new programs the moment they come on the market.

A New Synthesis

During 1986 the huge group of computer intimates (people who love to use computers, but don't have the faintest idea how they work) will merge with the much smaller group of computer literates (people who insist on being knowledgeable about the goings-on under a computer's "hood"). As a result of this merger, the home computer market will again be relatively homogeneous and unified.

At that time both groups will realize that the average person doesn't want to buy a computer "kit." But they will also realize that computers can never become black boxes—like toaster ovens or TVs. No matter how friendly the software, no matter how simple computers are to use, computers will still need to be programmed. Programming is an unavoidable part of computing.

But programming, in 1986, will not be equated with learning BASIC or Logo or Pascal. Instead, it will be a more general-purpose discipline of (goal-oriented, problem-solving, and algorithmic) thinking. And it will be practical and *application-oriented*.

Even when people use a friendly, commercial program, they must do some programming themselves. No matter

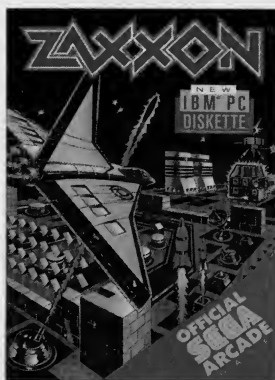
how advanced the program, the computer cannot do everything itself. When people use a word processor, they are programming a document. When they use a data base manager, they are programming their electronic file cabinet. When they dial up CompuServe or the Source, they are programming their electronic telephone, post office, newspaper, catalog, or library. Programming can be easy, menu-driven, and done with icons and mice, but it is still programming. Human beings still have to do some of the work.

Computer Builder Kits

We are on the verge of a new generation of computer programming languages—high-level, application-oriented *builder kits*. In the future, computer literates and intimates alike will use these new languages to "build" their own music, colorful pictures, animated cartoons, robot pets, interactive simulations, computer advisors, and electronic tutors.

With the right software, the computer can be a multipurpose appliance. It is the ultimate "Mr. T": a Toy, a Tool, or a Tutor. But whatever it is, the computer will still need further programming *after* we bring it into our home. We will have to program it so that we can mold it exactly to our evolving needs and our desires.

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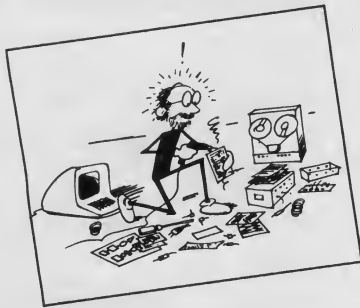
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Computing Together

Fred D'Ignazio, Associate Editor



New research suggests that infants are much brighter than we once thought. This research has prompted anxious parents who are worried about their children's ability to cope with a high-tech future, to enroll their

infants in computer courses before they are even out of diapers. After class, the parents bring the kids home and drill them using flash cards. On the cards are written words like RAM, ROM, BITS, and BYTES. The parents think that early familiarity with computer technology and jargon will be the youngsters' ticket to a good college and a successful career.

Unfortunately, these parents are teaching their kids skills that may soon be obsolete. After all, it will be the twenty-first century before today's infants enter college or the job market. Between now and then, computers are going to change drastically.

Instead of concentrating on bits and bytes, parents of young children should concentrate on

more general skills. They should strive to build a relaxed, comfortable relationship between their children and computers—a constructive relationship that enhances the child's self-image and self-confidence. As the child gets older, this sort of relationship will be more enduring and more valuable than specific skills which may quickly go out of date.

Toddler Burnout

Understandably, parents want their children to do something productive on the computer. For example, they may buy drill-and-practice software that will help give the child a boost in a school subject with which he is struggling.

At first, this approach works well. The child diligently works at the computer and seems to be making progress. But then boredom sets in, the software's novelty fades, and the child loses interest in the computer. The parents' natural reaction is to make the child sit at the computer and continue drilling.

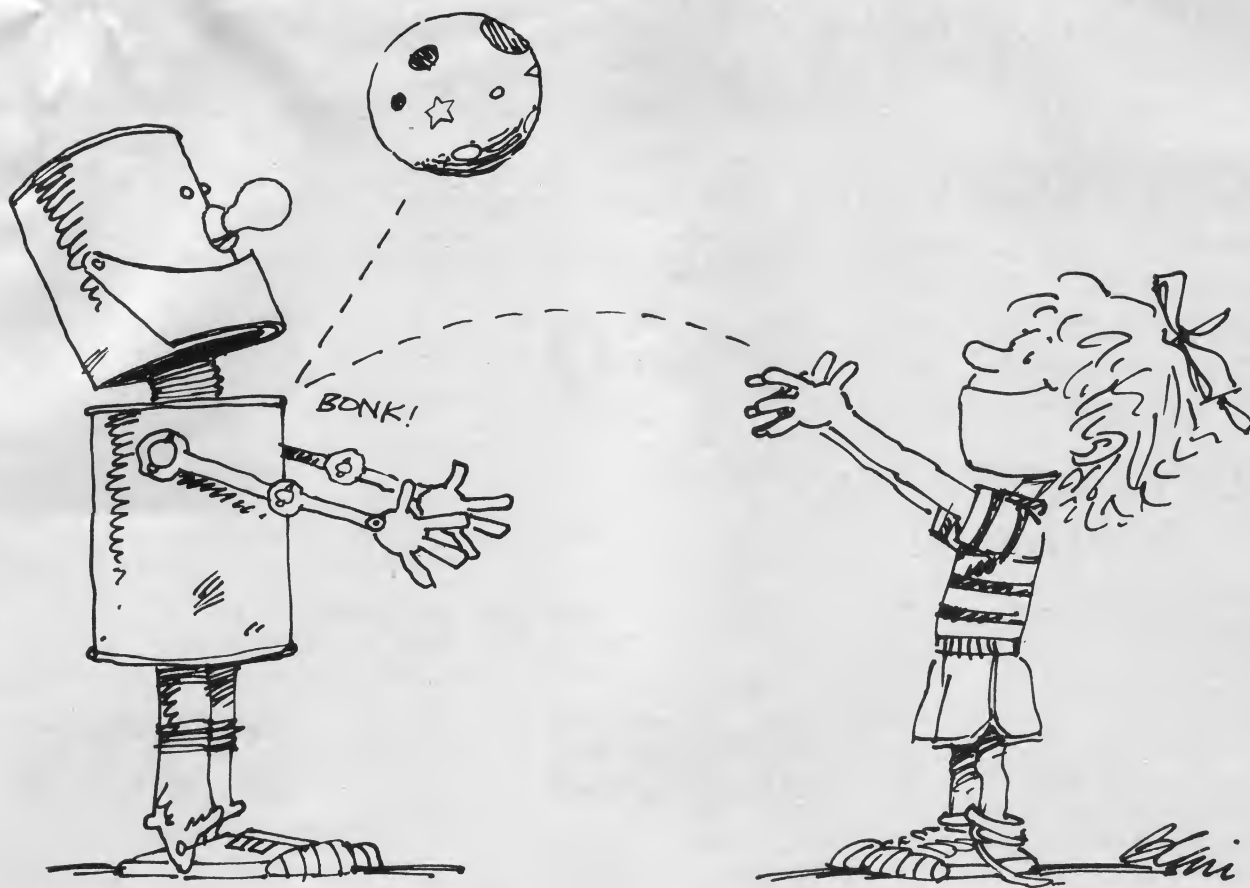
Unfortunately, this approach may lead to *toddler burnout*. For many kids, the joy of computing is replaced by the drudgery of computing. Computers are no longer fun, they are pure work. If kids are "strapped to their computer" every afternoon (as I was once strapped to my piano), they could develop a lifelong negative attitude toward computers and a mental block about using them.

The Computer Playground

We have so many computers around our house that people think we must be a futuristic family. They think that our computers are plugged into everything, including the coffee maker, the thermostat, the bathroom scales, and the toaster oven. They think we live computerized lives.

Fred D'Ignazio is a computer enthusiast and author of several books on computers for young people. His books include Katie and the Computer (Creative Computing), Chip Mitchell: The Case of the Stolen Computer Brains (Dutton/Lodestar), The Star Wars Question and Answer Book About Computers (Random House), and How To Get Intimate With Your Computer (A 10-Step Plan To Conquer Computer Anxiety) (McGraw-Hill).

As the father of two young children, Fred has become concerned with introducing the computer to children as a wonderful tool rather than as a forbidding electronic device. His column appears monthly in COMPUTE!.



Nothing could be further from the truth. When I get the chance to tell people what really goes on, I say that we have an Erma Bombeck household. Sure we use computers, but not to make our lives more rigid, organized, and mechanical. Instead, we use them as an electronic *playground*—and not just for Catie and Eric, but for me and my wife, Jan, too.

When people ask me what kind of software we buy for the kids, I say that we buy the software that turns *us* on. Then when the kids see us using the computer and having a good time, it gets them excited, too.

At my house we don't think of play as trivial. To us, play is a product of love. If we love to do something, it isn't work, it is play.

I would like my children to love to use computers, to use them playfully and creatively. I never want my kids to feel that computers are chains tying them to a hateful task. Instead, I want them to see computers as wings that enable them to swoop, dive, and have fun, and take them to new heights and soar to the limits of their abilities and imaginations.

The Computer As A Babysitter

The computer makes a great babysitter—even better than TV (unless you have cable, a VCR, and lots of tapes). It will soon be a big tempta-

tion for parents to turn on the computer to get their little kids out of their hair.

The computer can make a healthful babysitter—to a point. It can provide a much-needed break for a harried parent. And it can become a child's companion and a patient teacher. Also, *flying solo* on a computer can be a very positive experience for a child. It can give them a sense of control, mastery, and responsibility that they seldom experience at such a young age.

However, it is easy for little kids to get too much of a good thing. More than computing they need time to play with other children, get lots of exercise, fresh air, and experience the joy of swinging, digging in sand, and getting elbow-deep in finger paints.

Most important of all, they need to spend time with their parents. Computers make great toys, but they cannot replace parents. Parents are children's first and most important toys. Computers make a very poor substitute.

New games are starting to appear (including many programs from Children's Television Workshop, Spinnaker, Sunburst, and Counterpoint Software) that encourage parents and children to play on the computer *together*. Then the computer changes from being a babysitter that isolates the child to an *electronic hearth* that brings the whole family together actively and

happily. In fact, studies at New York University suggest that computers *encourage* families to spend more time together.

Computer Elevator Shoes

Computers are like booster shoes. They can give handicapped people a boost so they can go about their lives on par with the rest of the world. Computers can also play this role with young children.

My children are always at the bottom of the family totem pole, *except when they use the computer*. I encourage five-year-old Eric and eight-year-old Catie to do things on the computer that enhance their abilities, that increase their self-respect and self-confidence, and give them a leg up on the rest of us. Here are some of the things our kids do on their computers:

- **Gobbledygook Processing.** Five-year-old Eric bangs on the keys of the computer and gets it to print out page after page of gobbledygook. Eric is learning how to type, he thinks he is doing work, and he takes his gobbledygook to school and sends it to both his grandmothers. Remarkably, the gobbledygook is gradually starting to make sense. Real words, phrases, and sentences are starting to appear. Most important of all, Eric is developing the habit of using the computer as a *tool* to help him think better and not as a crutch to do his thinking for him.

- **Training The Family Pet.** Catie and Eric treat our computers like pets. Sometimes they pull their tails, but mostly they are learning "computer manners"—how to treat the computers kindly and responsibly. They can turn on all the computers, use the floppy disks and cartridges, and call up all their favorite programs. Eric, for example, is so good that when I hired a housekeeper and a secretary, he taught them how to use the family computers.

- **Computer Scribbling.** Catie and Eric have a skill that Janet and I have lost: They can scribble! When we turned Catie and Eric loose on a computer touch tablet—like the PowerPad from Chalk Board and the KoalaPad from Koala Technologies—it was incredible. The tablets enhanced the kids' motor skills, allowed them to make fine, detailed changes to their drawings and pictures, and gave them the freedom to creatively scribble. We now have a slideshow of the children's computer pictures and a door full of their drawings on the new Macintosh computer.

- **The Computer Sandbox.** The children play games on the computer that give them the most control. *They* control the computer, rather than the other way around. One of the children's most popular games is to play on the keyboard, pushing buttons just to see what happens. They call

this "Flying the Cursor." Doing this they have discovered how to get the computer to make moving rainbows, colorful letters, upside-down letters, pictures, and sounds—all without writing or buying a single program.

- **The Electronic Picturebook.** The kids have both learned how to read by using computer adventure games for young children like Sierra On-Line's *Troll's Tale* and *Dragon's Keep*. They enter the microworlds inside the computer and instantly become the heroes at center stage. To journey through the world they have to remember where they are, and read the signs in the pictures and the messages at the bottom of the screens. In these games, words gain real meaning and power. They are the keys Catie and Eric use to outwit an ugly troll or rescue small animals from a mean dragon.

Robots: Bag Ladies And Alarm Clocks

We have lots of computers around the house, but we also have robots. In fact, we run a flophouse for robots. We never know when a robot will come to our door looking for a home. Then I write an article about the robot, and, pretty soon, we have to send the robot along to another writer so they can write about the robot, too.

My children love robots—not as servants, but as pets. When TOPO the robot came to visit us, for example, my children noticed that TOPO was naked and dressed it in various costumes. My son tied his blanket to TOPO and turned it into a superhero. My daughter dressed TOPO as a New York bag lady, as a little girl, and as a witch, complete with a long pointed hat, a black cape, and vampire teeth.

TOPO never washed any dishes, made any beds, or took out the trash, but it was still useful. Every school morning, I turned TOPO on and sent it into the children's bedrooms to wake them up. When Jan and I wake up the kids they growl, whine, and complain. But when TOPO appeared, did a silly jig, and said, "Wake up, sleepyheads. Time to get out of bed," the kids got up smiling and gave the robot a hug.

Robots may never be good as maids or butlers, but they make great pets and alarm clocks. ©

COMPUTE!
The Resource.

Are Computers A Home Appliance?

Fred D'Ignazio, Associate Editor

Necessary, Easy, And Inexpensive

In recent columns I have written about a growing consumer awareness that things are not right with the microcomputer industry. Some misleading advertisements have made people buy computers as a home appliance. Unfortunately, the computers have not met some people's expectations, and then ended up gathering dust in the closet.

To be a legitimate home appliance, a product should have three characteristics:

- It should be inexpensive.

- It should meet a real need.

- It should be easy to use.

Let's look closely at each characteristic, and see how computers measure up.

A home appliance should be inexpensive. A low-end computer often appears to be inexpensive, but it turns out to be costly after a person adds the necessary "extras," including a disk drive, a printer, and some basic software.

A home appliance should meet a real need. For example, people use telephones to communicate; TVs for entertainment and news; ovens to cook food; and refrigerators to keep food fresh. But what do people need computers for?

A home appliance should be easy to use. For example, you can pick up a phone, dial seven numbers, and reach another person within seconds. You can push a button on a TV, and the world enters your living room. You can pull down a lever on the toaster oven and get a hot biscuit.

When you turn on the computer, it says, "READY." But it is not really ready. First you

must load in additional software, turn on additional appliances (disk drives, a printer, a modem, etc.), answer questions, and type in additional information. All these cumbersome, time-consuming steps make the computer ready, but they do not make it easy to use.

WASH! Magazine

How do people learn how to use computers?

They might join a user group, ask a kid, or read a computer magazine.

A magazine like COMPUTE! can be a lifesaver for the consumer who has just bought an inexpensive computer. The magazine offers easy-to-read tutorials, practical tips, and lots of excellent, affordable software.

Kids can also be helpful. So can user groups. But all this is beside the point. The real question is: Should a home appliance be this difficult to use?

To put this question in perspective, ask yourself how many people would own a washing machine if, to operate it, they had to buy a monthly magazine called WASH!, and they had to get help from a washing-machine whiz kid and attend weekly meetings of the Whirlpool User Group?

And how fair is it to our children to assume that they will know how to use a machine that has us puzzled and bewildered?

It is easy for kids to get *intimate* with computers, because they share few of our fears, anxieties, and prejudices about these machines. But it is not nearly as easy for them to get *computer literate*—to be competent computer users and programmers. Nevertheless, we adults now

have the misconception that all children take to computers as naturally as ducks to water. But what if our children *don't* take to computers? Does that make them less intelligent or less able than their friends? And where does that leave us?

A Growing Backlash

When millions of people buy a computer, take it home, then discover that it is not going to be inexpensive, that it meets no immediate need, and that it is not always easy to use, how do they feel? Whom do they blame?

Until recently, most people blamed themselves, their families, and their kids. But this is beginning to change. Too many people have been disappointed by computers, and they are talking to their neighbors. The secret is finally out. The fault is not with the consumer. It is with computers themselves—and the companies that make them.

New Consumer Savvy

The computer price wars of 1982–1983 had a disastrous effect on the computer industry and drove many companies out of the market, including Texas Instruments; Mattel, and Timex. In addition, many naive customers were lured by incredibly low prices into buying low-end computers. Unfortunately, the customers had no idea what to do with the computers once they

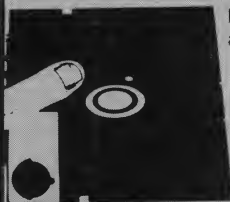
got them home.

However, in spite of these setbacks, the ultimate effect of the price wars may be positive. Between 1982 and 1984, large numbers of people bought “throwaway” computers, became disgruntled consumers, and described their experiences to their neighbors. The result is that, today, people are a lot more knowledgeable about computers than they were just a year ago.

In fact, people's bad experience with computers and their “sour grapes” reaction have created a mild consumer backlash against computers. The average consumer, in mid-1984, is much more skeptical about computers than he was in 1982 or 1983. He realizes that a good price is not the only thing to look for when choosing a computer for the home. He understands that computers, to be useful, need good software, memory, printers, and disk drives. He realizes that even with all this equipment a computer is *not* a home appliance. On its own it won't guarantee him or his family anything.

The average consumer is returning to the healthier show-me attitude that prevailed before the era of *high-tech chic* that reigned from 1982 and 1984. “Show me real needs that computers meet,” the consumer is saying. “Show me a computer with no hidden costs that is useful and simple to operate.” ©

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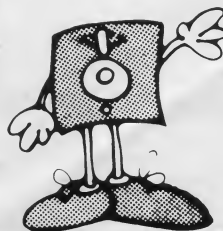
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THE WORLD INSIDE THE COMPUTER

Build A Computer In Your Mind

Fred D'Ignazio, Associate Editor



In my recent column, "The Morning After," in the May and June 1984 issues of *COMPUTE!*, I wrote about a new kind of programming that I believe people are beginning to do on their computer. I

called this "neoprogramming" to distinguish it from traditional programming in BASIC or Pascal and from "no programming" in which people treat the computer as a thinking machine and let it do their thinking for them.

In this month's column I'd like to explore neoprogramming and see how it can be related to computer activities that will help people develop thinking, learning, and communication skills that they can practice and refine using the computer, and that they can also take away from the computer and use, on their own, in all areas of their lives.

Neoprogramming

Neoprogramming can be defined as borrowing the most powerful ideas from programming languages and turning them into thinking skills that people can use, inside their head, in their daily life.

Another way to look at neoprogramming is as a toolbox that has three kinds of tools inside:

Fred D'Ignazio is a computer enthusiast and author of several books on computers for young people. His books include Katie and the Computer (Creative Computing), Chip Mitchell: The Case of the Stolen Computer Brains (Dutton/Lodestar), The Star Wars Question and Answer Book About Computers (Random House), and How To Get Intimate With Your Computer (A 10-Step Plan To Conquer Computer Anxiety) (McGraw-Hill).

*As the father of two young children, Fred has become concerned with introducing the computer to children as a wonderful tool rather than as a forbidding electronic device. His column appears monthly in *COMPUTE!*.*

- ☐ Tools to Help You Think
- ☐ Tools to Help You Learn
- ☐ Tools to Help You Communicate

These are practical tools that will be valuable no matter what people's goals are. Mastering these tools is more worthwhile than simply learning how to operate a computer.

Thinking, learning, and communication tools can be found in many places—in textbooks, in courses, in jobs, etc. But they can also be found, in a concentrated form, in the computer. And through extensive use and familiarity with these tools on a computer, people can learn how to use the tools to think better without the computer.

How Not To Use A Computer

Learning how to operate a computer, on its own, will not automatically guarantee people a successful career, help them learn how to use more advanced computers of the future, or give them thinking skills they can apply to other areas of their lives.

Also, it is possible to have a relationship with computers that actually deadens or stifles the ability to think. Many people, for example, use computers mechanically and passively. They spend their time in front of a computer entering information, making trivial, routine queries, or typing other people's documents.

The Thinking Appliance

There is a strong assumption in many people's minds that computers are labor-saving appliances. People ask, "What can I do on a computer?" But what they mean is, "What can the computer do for me?" The labor that many people hope computers will save is not mechanical labor but thinking labor. For most of us, thinking is work—work that we would avoid if we had the chance.

Many people would be happy (though few would admit it) if computers would do their thinking for them. In the near future, with the

advent of expert systems and friendlier computers, there is a great risk that computers will take over more and more of the thinking that people do. As a result, people and organizations will become increasingly dependent on computers.

Dumbo's Feather

For adults at work and at home, and for children in school, there is the risk that computers will become super calculators. When they want to do real work or thinking, they will, by habit, turn to the computer. The computer will become an adjunct to the person's mind. The computer will be like Dumbo's feather. Dumbo the elephant could fly because of his big ears, but he thought it was because of his magic feather. If he didn't hold on tight to his feather, he was afraid he couldn't fly. People may come to feel incapable of thought unless they do it using their computer.

The Computer Crutch

There is a real risk that many people will use computers as a crutch. They will expect computers to do their thinking for them, or they will be afraid that they cannot think without the aid of the computer. Either way, they will be tied to computers to help them carry on their daily affairs.

Also, if people use computers (or anticipate using computers) as a crutch, they will not get the most out of them. They will be using computers' powerful computational, communications, and information handling functions sloppily, indiscriminately, and inefficiently.

The Computer Lever

In fact, the computer is not a thinking machine, a magic feather, or a crutch. It is a complex lever. It amplifies our abilities to move information around, but we must position and guide it to get what we want.

In addition, we don't need to tie ourselves to the computer to use its lever. We can build the lever inside our head. The lever is, in fact, just an assortment of thinking skills embedded in general-purpose (BASIC, Logo, Pascal, Assembler, etc.) *procedural* languages and special-purpose (word processing, spreadsheet, file handling) *builder kit* languages. Once we have acquired these skills, we can employ them on the computer, or we can use them inside our heads. If we recognize and master these skills, we can get more out of using the computer, and we can become less dependent on it and more skilled, on our own, to think, learn, and communicate.

Building A Computer Inside Your Head

Burrell Smith, Apple's hardware wizard who

helped create the Macintosh, has written that he never just goes into a workshop and builds a new computer. Instead he first spends considerable time building mental prototypes inside his head. Burrell's prototypes are like a writer's rough drafts. Using mental prototypes, he takes a rough, simple idea and turns it into a cluster of complex ideas, and eventually into an advanced concept or design. Then he begins building the computer.

Burrell can create mental prototypes because he has a computer inside his head. Burrell has built this computer from an array of thinking skills he has learned from programming real computers and from his other experiences in life. These skills aren't mysterious, nor are they Burrell's alone. They can be mastered by anyone.

Environments For Thinking

Programming languages offer an environment for thinking—a place in which these skills can be learned, practiced, mastered, and then used. Learning a programming language offers an opportunity to explore new avenues of thought.

For example, if taught properly, BASIC, Pascal, Logo, and other languages can help people learn algorithmic thinking, how to break complex problems into smaller, simpler problems, and how to organize large quantities of information.

A word processing program can give people a feeling for the fluidity and mobility of words, ideas, thoughts, and knowledge. It can help them learn how to create several rough drafts, in quick succession, that sharpen an image, refine a concept, or lead to new ideas.

A spreadsheet program can help break a complex situation down into lists and arrays of smaller parts. It can display the whole forest and the individual trees in the forest, all at the same time. It can also reveal the relationships between all the parts.

A file-handling (data base) program can teach how to organize thoughts, feelings, experiences, and information. It can show how to group facts according to categories of likeness, how to sort and prioritize, and how to cross-reference facts that have certain traits in common.

Graphing languages, word processing languages, and telecommunications languages, singly or together, can teach how to better communicate feelings, ideas, and desires. They can teach how to use visual images and symbols, page layout and design, and grammar and style to communicate more effectively.

Magnets For Thinking, Learning, And Communication

Computers, like other media, can have a push-pull effect, depending on how people use them.

If computers are used inefficiently or inappropriately, they have to be pushed just to get meager, mediocre results.

On the other hand, computers can also exert a powerful pulling effect. They can be so attractive, so elegant that they will pull at the mind, like a magnet. They can almost seduce a person into performing a task or solving a problem.

Magnets And Road Maps

Computer tools can pull you like a magnet to the computer, but they can also become magnets inside your head that draw related information and ideas toward them. They can help you make sense out of chaos. They can let you mentally map out individual facts in some kind of logical, coherent, and practical order.

For example, what happens if you think about two things: a paper route and a spreadsheet? What kind of associations can you make? How might you map the paper route onto a spreadsheet?

You don't need to use a computer to do this exercise. Instead, you can perform what Albert Einstein called a thought experiment. You can build a mental prototype of a paper-route spreadsheet inside your head.

Associating spreadsheets and paper routes is not a dull, artificial, or mechanical activity. If you have the proper image, appreciation, and passion for using spreadsheets as a thinking skill, you start mapping the paper route onto the spreadsheet even before you know it. The spreadsheet, as a thinking tool, or metaphor, will draw your thoughts playfully and automatically. When you begin thinking about the paper route, your mind will unconsciously make an association with spreadsheets and figure out how the two are related.

For example, you might start thinking of the different houses on the paper route as columns. You might think of the people's names, addresses, telephone numbers, amounts owed, and your last collection date as rows in the spreadsheet.

You might also think of mapping the spreadsheet paper route into a data base in which you could quickly determine who owes you for the papers, who is the most overdue, and what might be the most effective collection route for you to follow on your bicycle or in your car.

In fact, you might never put all this information onto the computer. It might be too much trouble entering the information and keeping it up-to-date. But this doesn't matter as long as you have a model of the spreadsheet or the data base inside your head.

For many, many applications in life, building a mental prototype inside your head is enough.

It's not practical to go any further. The value of the computer skills is not that you use them on the computer, but that you can organize information, perform tasks, and solve problems better inside your head. This helps you become a better thinker, learner, and communicator on your own. You don't need a real computer around. You can carry one inside your head.

Learning Through Play

One of our greatest joys in life comes when we play—or when we feel we are playing. We might be working, but if it feels like play, we will be more motivated, more intense, and do a better job.

Passion and joy are not attributes of work but of love. And when we love what we are doing, it is never work. No matter how difficult the activity is, it feels like play.

I think that people can use computers to think playfully, learn playfully, and communicate playfully. The real joy of computing doesn't come from getting a job done faster, easier, or cheaper; it comes from making the job more challenging and more fun while you're doing it.

Are You A Neoprogrammer?

How is your relationship with your computer? Does your computer challenge you to think, learn, and communicate better? Does it make work more fun and interesting? Have you been able to take your computer skills with you when you leave the computer? Can you think on your own when your computer is turned off?

If you can, congratulations. Maybe you are a neoprogrammer and you don't even know it.

Whether you think you are a neoprogrammer or not, I'd like to hear your thoughts. What do you think about building a computer inside your head? Please write to me:

Fred D'Ignazio
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How Computers Made Me Smarter After Only Thirteen Years Of Daily Use

On this occasion of my third anniversary as a COMPUTE! columnist, I am going to look back, back into the mists of time, and count (on my fingers and toes) all the blessings computers have brought me.

Blessing 1: Cuisinart-Brain Thinking

Sometime ago I was up in Toronto, Canada, making a speech to educators on using computers in the classroom, and after my speech, an educator came up to me and complimented me by telling me I was an "integrated brain thinker." She explained to me that, from my speech, it was obvious that I could think with my left brain (the analytical side), and I could think with my right brain (the creative side). Ergo, I must be an integrated brain thinker.

I was flattered, but modestly I said she was far too generous. I told her that I wasn't a left-brain thinker, a right-brain thinker, or an integrated-brain thinker. Instead, I said, I was a *Cuisinart-brain thinker*. As a Cuisinart-brain thinker I had the rare ability to process facts and ideas by slicing them, dicing them, mixing them together, then spinning them around. I told her I owed my talent to a long and deep association with computers.

Blessing 2: An Algorithmic Lifestyle

The next morning after I had talked to the educator in Toronto, I was in the shower in my hotel room. I had soaped up and rinsed off, so I was ready to turn the shower off.

With my computerlike memory I recalled that most showers have screw handles. You usually turn them to the left to get more water; and you turn them to the right to get less. Since I wanted less water, I turned my shower handle to the right. The algorithm was simple and clear, and I was determined to follow it.

However, when I turned the shower handle to the right, the water didn't turn off. Instead, it became cold—*freezing cold*.

Gasping from the ice-cold water and dancing around in the shower, I swiftly concluded that:

(1) My algorithm had some bugs in it;
(2) To the right was not the way to shut the water off in *this* shower; and (3) I had better find a way to shut off the water soon or I would succumb to acute hypothermia.

I clenched my teeth and coldly reasoned that if the shower didn't shut off by turning it to the right, it must have a reverse screw in the handle. This made sense. I was in Canada, wasn't I? Canada is a foreign country. In Canada they probably used reverse screws for everything.

If the handle had a reverse screw, that meant that if I wanted to turn off the shower I had to turn to the left. Boldly I turned the handle all the way to the left to shut off the water.

This time I got a blast of steaming, scalding hot water. "Aagh," I yelled. I backed away from the shower head and conked my head on the towel rack at the rear of the tub.

In another moment I would be boiled like a

hot dog in my own shower. I had to think quickly. In a last-ditch effort, I called on my brain's full computer-trained reflexes and realized that my shower handle must not be a left-right, on-off shower handle at all. Instead, it must be a push-pull shower handle. Pull turned it on. (Something I had unfortunately forgotten.) And push must turn it off.

In a final, desperate gesture I charged toward the front of the shower and jammed the handle into the wall.

Instantly, miraculously, and logically, the shower stopped.

Blessing 3: Computers Give Me Lightning-Fast Logic

In the last year I have traveled to 13 conventions, made 49 speeches, given 11 interviews, and appeared on 18 radio programs and 14 TV programs. And I am not alone. There are dozens of others in the computer industry with a schedule similar to mine. We are roaming the country, playing with the latest gadgets, trading gossip about computer companies and their media superstars, and searching for juicy stories for our magazines.

Back in the spring I was attending so many events each week that sometimes I forgot which city I was in. But I never lost the lightning-fast logic that years of close association with computers had given me. That tided me over even during my most grievous overdoses of travel, speaking, and interviewing.

I remember well one conference I went to (which conference? which city?) when I was handed a name badge with a unique and wonderful feature. I noticed this feature the moment I put the badge on the lapel of my sport coat. The badge had been designed to allow me to look down at my chest and read my name as if it were rightside up.

During the day, as I made speeches at the convention and interviewed a number of illustrious conventioners, I continually glanced down at the badge and marveled at its design.

That night I went out to dinner, so I took the badge off and stuffed it in my sport coat pocket.

The next morning, when I put the badge on again, I was startled. All of a sudden the badge no longer worked. When I glanced down at it, all the information on it was upside down and backwards.

I puzzled over this problem all during breakfast that morning. At last, as I was munching on a sprig of parsley that had come with my fried eggs, it hit me. The badge was not a special badge after all. I could read my name the first day because *I was wearing the badge upside down.*

Blessing 4: I've Become A Whiz Around Machines

When I first got into computers I was no wizard with machines or a do-it-yourselfer. In fact I had almost no mechanical savvy at all. As proof I need only cite a test I took in high school in which I achieved a score of 0.06 percent for mechanical aptitude.

Yet I've always loved computers.

However, since computers are machines (a fact that I frequently try to overlook), I often run into problems. It's not their software or their logic that waylays me, mind you, since I have become quite a thinker in these areas (see my blessings above). Instead it's their physical nature—their "machineness"—that confounds me.

For example, last spring I was ecstatic when my newest computer toy arrived, special delivery, in the mail. It was a portable Compaq computer, and I intended to take it with me to London, England, to teach a course on robotics.

Except I couldn't get it open.

So, after I unboxed this lovely machine, I spent half an hour just looking at it on the kitchen table. But I couldn't, for the life of me, figure out how it opened up. It looked like a big ivory-colored sewing machine or suitcase, except there were no handles, no latches—no *nothing*.

I was getting more and more nervous and depressed as the minutes ticked away. My plane to London would be taking off soon, and I had to get packed, yet I hadn't even turned the computer on. Maybe it didn't work. But how was I to know. I couldn't get inside to find out.

I sat there and stewed, and I cursed my miserable 0.06 percent mechanical aptitude.

Then Catie came home from school.

Catie is my daughter, and even though she was only seven years old at the time, she was very perceptive. She immediately noticed something was wrong when she saw me slumped over the kitchen table, crying on what looked like a sewing machine.

I told her my problem, and she began snooping around the computer case looking for a way to open it. About fifteen seconds later, she popped up from the other side with a big grin on her face. "No wonder you couldn't open it," she said. "You were looking at the top. The latch is on this side—on the bottom."

Five minutes later, Catie had the computer out on the table, plugged in, and running a word processing program. "You shouldn't cry over a computer, Daddy," she advised me. "Wait until I come home from school next time, and I'll help you."

More Ways Computers Made Me Smarter After Only Thirteen Years Of Daily Use

Last month, on the occasion of my third anniversary as a COMPUTE! columnist, I recounted some of the blessings computers have brought me: *Cuisinart-brain thinking* (the ability to process facts by slicing them, dicing them, and mixing them together); an *algorithmic lifestyle* (applying patterned thinking to problems of everyday life, such as how to turn off an unfamiliar shower faucet in a hotel bathroom); *lightning-fast logic* (like the time it took me only 24 hours to realize I was wearing a name badge upside-down); and new-found *mechanical aptitude* (as evidenced by my futile attempts to open up a new portable computer until rescued by my seven-year-old daughter).

But the blessings don't end there. No, 13 years of working with computers have enhanced my life in other ways as well. For example...

Blessing 5: I've Become A Whiz With Robots

My family and I live an "Erma Bombeck lifestyle." That means our house is a mess, our lives are chaotic, and we struggle through each day doing our best just to cope.

But last week was even worse.

Last week a film crew from the PBS program *The New Tech Times* descended on our house to shoot a profile of me and my family (and our 14

robots and 23 computers), and a robot product review.

The film crew arrived Thursday morning and spent the entire day taping program segments all over the house. They filmed in my study, in the dining room, the rec room, the hallways, and in our bedrooms.

At one point, late in the day, my wife Janet came into the house and gasped. She had absolutely forbidden us to shoot in the living room, yet there we were, complete with a dozen robots, giant, aluminum umbrella reflectors for the camera lights, and thick, snakelike cables draped over our new couch.

In total despair, Janet dashed into the room, and swiped up the Christmas cards that had been sitting over the mantelpiece for at least seven months. "I can see there are no wives and mothers on this film crew," she muttered as she stalked out of the room.

Earlier in the week, to get ready for the program, I had panicked and gone "over the top" (as the English say), and tried to get everyone in my life into the show. I had my mother fly in from Pennsylvania to show how she and Catie have become computer pen pals on *The Source*. I had helped my five-year-old son Eric set up cubbyhole "offices" under his bed and underneath my desk in my study so he could show

how he uses a portable computer to do "gobbledygook processing."

I had organized two dozen neighborhood kids to try to teach one of our robots how to skateboard. We had bought Topo the robot a black cape and programmed him to breakdance with Eric, to the tune of Michael Jackson's "Beat It." We had enlisted the teachers and students in a preschool and two high schools to show how they were programming computers and robots and playing with them. And I had even managed to persuade Olga Pagenhardt, the 70-year-old director of Roanoke's "Programs for Retired People," to be present to show my concern for senior citizens and computers.

To get to all the schools and other sites for filming, we formed a caravan of vans and cars, loaded with people, cameras, computers, and robots, and we wound our way, in a big hurry, around the streets of Roanoke. Robots sat on car seats and on the floors of the vans, and peeked out of every window at fellow motorists and passersby. And each time we turned a sharp corner, a robot would tumble over and lose an arm or bend an antenna.

The house was literally crawling with robots. We had a HEROjr, we had a Talking Topo, we had a F.R.E.D. (Friendly Robotic Educational Device), a Maxx Steele, a Big Trak, an Armatron, and eight little crablike robots that bounced and hobbled their way across our kitchen floor.

The robots were the center of the show, but they were so *finicky* they almost caused me to have a nervous breakdown.

We had a HEROjr, for example, for two weeks before the program. He worked perfectly, he visited the kids at the preschool a couple of times, and he was a lovable addition to our family.

Then, inexplicably, he ceased to function.

To bring him back to life, we tried human-to-robot resuscitation. We tried pulling off his head, taking off his clothes, and everything else we could think of. But no luck. He was in the Robot Happy Hunting Ground, and we couldn't bring him back.

That's just when Topo the robot decided to become a problem. Topo, too, had been A-OK for over a month. Then, in quick succession, he suffered memory lapses, his infrared "eye" stopped working, and, worst of all, his recharger disappeared. Anybody who has ever hung around with robots knows how serious it is when a robot can't find his recharger.

Wednesday afternoon, the day before the TV film crew came, was the worst. Topo wasn't working. HEROjr wasn't working. And we had just gotten a shipment of little robots in the mail, and the most important little robot was broken.

"I give up!" I cried. "I hate robots! I never want to see another robot! Get them out of my sight. I'm going back to bed."

Then Eric came to the rescue.

Eric had just come home from school and walked in on my tirade. In his own breezy, take-charge manner, five-year-old Eric barged into a kitchen filled with computers, robots, and adults, sat down at the table, and began fooling with the broken robot.

A moment later it beeped!

Then its lights came on. And it beeped again.

Then it began jerkily moving around the kitchen table. It crawled. It stopped. It lurched. It stopped. It looked like a tipsy turtle ambling across a fishing boat in high seas.

When I saw the robot work I grabbed Eric and gave him a big kiss and a hug. "I don't believe it," I said. "You fixed it. How did you do it?"

"I just pushed the buttons," Eric said. "Do you have any more robots I can fix?"

Eric's dramatic rescue of the robot turned the whole day around. Within minutes we had found Topo's recharger, and we had lined up a new HEROjr to arrive before the TV crew showed up the following morning.

Eric and I sat on the kitchen floor having little robots bounce, jounce, and try to run up our pantlegs. Once again I was happy. Once again I felt like Fred D'Ignazio, Robot Tamer Extraordinaire.

Blessing 6: I Can Spot A Shortcut A Mile Away

Last spring, I took several computers and robots with me to London, England, to teach a "Robotics Literacy" course. I described my adventures in the October 1983 issue of *COMPUTE!*, in my column "There's A Robot In My Room."

In that column, I told how I tried to make a HERO robot I had taken with me into a robotic alarm clock that would wake me at 5:30 a.m. each morning so I could prepare the lectures for my students before class.

I went to extreme lengths to get HERO to become an alarm clock. I positioned him perfectly, right beneath my bedroom window. I wrote a program in hexadecimal and loaded it into HERO by punching the buttons on top of his head. I activated his light sensor, so he could look out the window and watch the sun coming up, then wake me just after dawn. The sunlight was supposed to trigger his light sensor, which in turn would trigger HERO to start talking. "Good morning, Fred. Time to wake up. Get out of bed, you sleepyhead," he was supposed to say. "It's 5:30 a.m."

And he did say it. But he didn't say it at 5:30 the next morning. He said it at 11:00 p.m.

and again at 11:45 p.m. The second time he said it, I was sound asleep. And I was not happy to be awakened—especially by a robot.

Of course it was not his fault. I had programmed his sensor to be so sensitive to light that even the tiniest amount of light would set off his robotic alarm clock. The first time he went off, his sensor had detected my bedside reading lamp. The second time, it responded to the headlight of a passing truck.

After these two experiences, I lowered the sensitivity of the sensor, went back to bed, and happily slept through the night.

The next morning I heard banging on my door. It was my colleague at the robotics course, and it was 8:30 in the morning. I had overslept by *three hours*.

Why hadn't HERO awakened me? Later in the day, when I had had time to get dressed, teach a course, and grab a late breakfast, I calmed down enough to realize that I had now erred in the opposite direction. This time I had set HERO's sensor *too low*. It was now so low that only a supernova would turn him on.

When my article appeared in *COMPUTE!*, I received dozens of nice letters. The readers loved my stories about living with robots, and they wanted to know more about the robotics literacy

course.

Then, one day, I received a letter from a nine-year-old boy. He had enjoyed my article, too, he said. But he had one small question. Why, he asked, if HERO had a clock built inside him, couldn't I have written a little program to have HERO check his clock, and at 5:30 a.m. start talking and wake me up?

I wrote the boy a letter and answered his question simply and truthfully. "I didn't think of it," I said.

I showed my wife the boy's letter. That's when she christened me "Do It the Hard Way, Fred."

I wince when I admit it, but it is a perfect nickname. After all, I have spent thirteen years programming and working with computers and robots. I have been on intimate terms with machines of all sizes and personalities. But am I any smarter? Have computers made me a quicker, more logical thinker?

Judging from my experience with HERO in London and from all my other experiences, the answer is no. And it took a letter from a sharp little nine-year-old boy to make me realize it.

"Put your heart and soul into computing," I advised him in my letter, "and, one day, you may be smart just like me."



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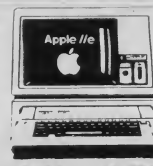
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THE WORLD INSIDE THE COMPUTER

Muppet Roundup

Fred D'Ignazio, Associate Editor

This month we're going to take a look at three computer products for children, all associated with the Muppets, that lovable gang of characters invented by Jim Henson and Associates in New York.

The first product we'll examine is the Muppet Learning Keys, codeveloped by Christopher Cerf of Henson Associates, Koala Technologies (which makes the popular KoalaPad), and Sunburst Software, one of the foremost educational software publishers. The keys cost \$80 and plug into the joystick socket on your Commodore 64 or Apple computer.

Muppet Learning Keys is intended for children age three and up. But it is not just for children. If someone is intimidated by computers and mystified by the computer's keyboard, then the Muppet Keys may be just the thing—at least to get started. The keys are large buttons with big, easy-to-read letters, numbers, words, and colorful pictures of the Muppets. They are easy to use regardless of the shape or size of your fingers.

The alphabet keys are arranged alphabetically, not in the mysterious QWERTY order you see on typewriter and computer keyboards. Next to these keys is a paint box to change colors on the screen. There is an Eraser to erase the picture on the screen. There is a Help key, in case you are lost and need help. There is an Oops key that lets you undo a mistake. There is even a Zap key

you can punch when you are tired of playing a game and you want to go back to the main menu and select a new game.



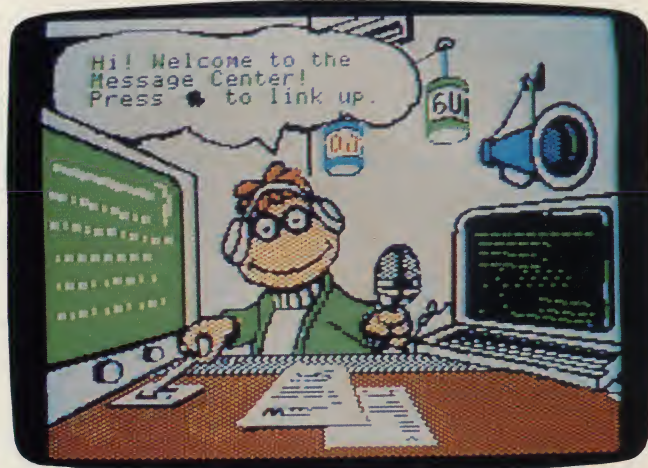
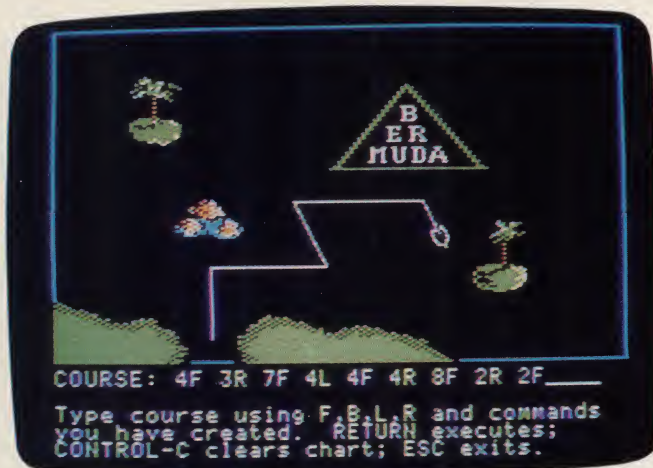
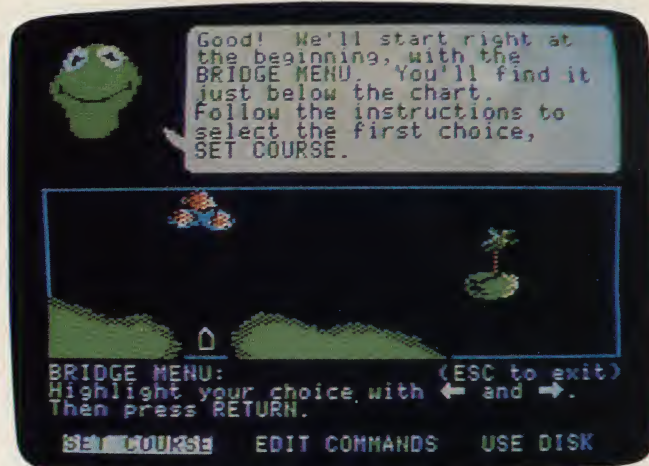
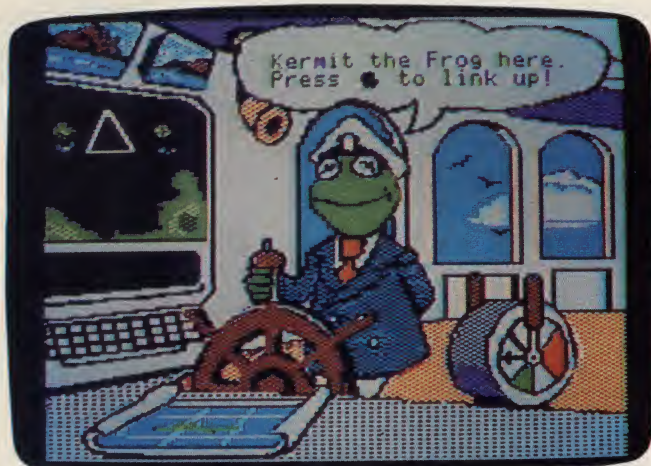
Koala Technologies' Muppet Learning Keys is an auxiliary computer keyboard especially suited for young children.

Fred D'Ignazio is a computer enthusiast and author of several books on computers for young people. His books include Katie and the Computer (Creative Computing), Chip Mitchell: The Case of the Stolen Computer Brains (Dutton/Lodestar), The Star Wars Question and Answer Book About Computers (Random House), and How To Get Intimate With Your Computer (A 10-Step Plan To Conquer Computer Anxiety) (McGraw-Hill).

As the father of two young children, Fred has become concerned with introducing the computer to children as a wonderful tool rather than as a forbidding electronic device. His column appears monthly in COMPUTE!.

Like other touch pads on the market, Muppet Learning Keys comes with software on disk. More software is planned for additional activities. However, the important thing to remember is that this is not just a new application or software product for your computer. It is a new keyboard for the computer—especially suitable for children and beginners. Already, some of the most prestigious software publishers are designing new games and educational programs for this keyboard.

However, since it's a new product, the only thing that works with it now is the Muppet disk from Koala Technologies. This might influence you to postpone buying the product until more software becomes available. Also, you might



Some sample screens from Brøderbund Software's *Welcome Aboard! The Muppets Cruise to Computer Literacy*, an educational program for youngsters.

wonder if it's worth paying \$80 for an additional keyboard with pictures of Muppets, paintbrushes, compasses, and rulers. Wouldn't kids be better off using real rulers and real paintbrushes instead of imaginary ones on a computer?

This seems like a good question—until you have seen a young child or a computerphobic adult approach a computer keyboard for the first time. Usually they're frozen into inaction by the bewildering number of keys and the strange symbols. Muppet Learning Keys offers an attractive alternative to the standard keyboard. It is a beginner's keyboard—familiar, colorful, and inviting—and both children and adults warm up to it quickly.

The Muppet Institute Of Technology

The Muppet Institute of Technology (or "M.I.T.") was endowed by Simon & Schuster to offer early learning courses to children who use microcomputers. The Institute is the whimsical creation of Frank Schwartz of Simon & Schuster's Electronic Publishing Division. It doesn't charge

a price for its software; it charges tuition. And in every package, children who complete the imaginary course are awarded a diploma and course credits.

The first two products come from the Institute's Reading Department and are intended for children ages four to eight. Each costs \$40 and will be available for the Commodore 64 at the end of the year, and for the Apple early in 1985. In *The Great Gonzo in Word Rider*, Gonzo's favorite chicken, Camilla, has been kidnapped and carried away into the mountains. Children go on a quest with Gonzo to rescue Camilla. They have to survive several hazards on the journey. On the way, they construct vehicles that allow them to make it safely through the hazards. The vehicles are fanciful—like Gonzo's Rolling Hornblower. Yet they are also logically suited for the particular hazard the child must overcome. On the way to rescuing poor Camilla, children gain skills in reading, vocabulary, word usage, problem solving, and elementary logic.

In the second program, *Kermit's Electronic*

Storymaker, children build stories using nouns, verbs, and prepositions, plus Muppets, locations of Muppets, and Muppet actions. For example, children can place Miss Piggy in a desert and make her fly, or they can set Kermit spinning under the ocean. Children learn new words as they build their stories. Then they can make the computer display their stories, like a slide show, and save the stories on disk so they can read them later.

Welcome Aboard! The Muppets Cruise To Computer Literacy

The third Muppet computer product, *Welcome Aboard! The Muppets Cruise to Computer Literacy*, comes from Henson Associates and Brøderbund Software and costs about \$40. This is another product, like the Muppet Learning Keys, that is ideal both for children age five and up and for all computer beginners.

You begin your voyage with the Muppets by viewing a cross section of their ship on the computer screen. The picture of the ship is really a disguised menu. You can choose different activities by pressing the arrow keys to position a small anchor in any of the rooms, including a Message Center, Computer Room, Joke Library, Salon de Beauté, Game Room, and the Bridge.

The beauty of *Welcome Aboard!* is that on the surface you're playing make-believe games with the Muppets, while actually you are learning about important computer applications, such as using the computer as an electronic typewriter, post office, and file cabinet. You are learning how to create computer pictures, or graphics, and how to program the computer. And, most importantly, you are learning to take control of the computer and use it as a tool to accomplish meaningful goals.

In the Message Center, for example, you don't just write letters. Instead, you send messages to the crew of the Muppet boat, and then they send messages back to you. You can choose to edit the messages or save them on disk for later reference. On the Bridge, you use a Logo-like Muppet programming language called Slowgo to pilot the Muppets' ship across the treacherous sea to its goal—either Pig Island or Frog Island.

In the past, I've been a major critic of teaching children how to program in regular computer languages such as Logo or BASIC because I feel that programming has little meaning to a child, and it has little practical use in the child's world. In *Welcome Aboard!*, however, both of my criticisms have been at least partly answered. Children program the computer to help the Muppets navigate a boat (a practical task), and to help them reach their destination without sinking (a

meaningful objective).

Worthwhile Products

Many of the computer products on the market for children suffer from the same maladies. Either they are trivial copies of activities children would be better off doing with paper, scissors, glue, modeling clay, and fingerpaints, or they are cheap commercial spinoffs of popular products in other media—software Smurfs, superheroes, and Barbie dolls. Or they are so insipid and uninspired that adults avoid them and children quickly get bored with them.

But the Muppet products are a pleasant surprise. They are charming, educational, and practical. They are equally attractive to children and adults. They take characters which are successful in other media—on TV and in the movies—and bring them to life on the computer "stage." They teach fundamental skills such as how to use a computer, how to read, plan, and reason logically, and they do it not by dull, rote drill, but with exciting adventures, like rescuing other creatures, piloting a ship across hazardous straits, and communicating with other creatures. These products teach computing not as a science or hobby, but as a tool to accomplish practical goals and to help other people.

However, the key ingredient in all these products is missing if you plop your child in front of the computer and walk away. The ingredient does not come packaged inside the boxes and it's not found inside any computer. The key ingredient is your attention. If you and your child use these products together, the experience will be far richer and more valuable for both of you than if you use them alone.

For More Information

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3100 Patrick Henry Drive
Santa Clara, CA 95050

Sunburst Communications, Inc.
39 Washington Avenue
Pleasantville, NY 10570

Simon & Schuster Electronic Publishing Group
Simon & Schuster Building
1230 Avenue of the Americas
New York, NY 10020

Brøderbund Software, Inc.
17 Paul Drive
San Rafael, CA 94903

THE WORLD INSIDE THE COMPUTER

Our Computer Handyman

Fred D'Ignazio, Associate Editor



Late last spring I was talking with David James, the computer instructor at Patrick Henry High School here in Roanoke, Virginia. I told David I was using and reviewing all sorts of computers, and I would love

to have an assistant who could help me with the technical aspects. I complained about my .06 percent mechanical aptitude (see my October and November columns, "How Computers Made Me Smarter After Only Thirteen Years of Daily Use"). David smiled. "I have just the student for you!" he exclaimed.

Two days later Howard Boggess showed up. Howard was a senior at Patrick Henry on his way to Tulane University in New Orleans. He had worked at a local computer store and was a dedicated hacker. Most nights (school nights) he would sit up fiddling with his Apple IIe with its twin monitor screens until 2:00 or 3:00 a.m.

Before Howard came we had lots of computer equipment around the house. But lots of it was unplugged, disconnected, or banished to the computer "graveyard" in the attic.

The computer graveyard was an eerie place. A magazine photographer working on a story once made me take him up to the graveyard. He

took pictures of me kneeling on the floor, surrounded and dwarfed by old card cages, S-100 motherboards, upended video monitors, twining, snakelike cables, stacks of out-of-date circuit cards, and dead computers. When his photograph appeared in the magazine I noticed that two joysticks were sitting on a box behind me and stuck up above my head like high-tech devil's horns.

When I first led Howard up into the attic, he was impressed. "Wow!" he said. "What is all this stuff?"

I explained, and he asked me why I stored it away in the attic. "Because I can't make it work," I confessed. "So I bring it up here. I don't have time to fix all this stuff. I'm a writer, not a computer mechanic."

Howard was appalled. All his computer equipment was scavenged, secondhand, and patched together. To him my graveyard looked like the delicious leftovers from a sumptuous royal banquet. "Maybe we can use some of this equipment," he said.

"All right," I said. "Do with it what you will." I turned around and fled back downstairs, glad to return to a world where at least some of the machines were still alive.

A Houseful Of Computers

Howard worked up in the attic for about a month, unearthing and resurrecting the machines. Then he brought his motley crew back downstairs. The machines made a miraculous recovery and beeped and whirred and processed information like any of my other healthy computers.

Howard had worked a major miracle, but he didn't stop there. Once he returned downstairs, he began fixing and plugging in all the computers that lay idle or ignored. And, I'm embarrassed to admit, there were quite a number of machines that fell into this category.

My five-year-old son Eric was impressed

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As the father of two young children, Fred has become concerned with introducing the computer to children as a wonderful tool rather than as a forbidding electronic device. His column appears monthly in COMPUTE!

with all the new computers we seemed to have around the house. He didn't know we had so many computers because most of the time they didn't work.

Eric came home from kindergarten one day and walked around the house, watching all the machines happily spitting out paper, playing music, and flashing words and pictures. When he arrived in my study, I could see that he was in awe. When he asked me who had fixed them all, I named Howard. "How did Howard do it?" he asked.

Just then my eight-year-old daughter Catie stuck her head in the door and answered, "Because Howard is naturally intelligent."

"Unlike Daddy," she continued, "who is naturally dumb."

The Computer Party Line

One day while I was tapping away at my computer keyboard in my upstairs study, Howard came in and asked me why none of the computers was connected to a modem. I knew that Howard was a bulletin board fanatic. He spent most of the time using his Apple to roam around the country's bulletin boards, trading software and acting as dozens of people's on-line handyman.

"It seems a shame to have all these computers," he said, "and none of them can talk to each other."

I think I must have scratched my head at that point. Or else maybe I nodded. In any case, Howard took that as a green light to get our computers on-line with each other and communicating. Within a month he had every computer in the house talking with every other computer. We had joined four information networks, and the phone company was making house calls every other day.

By the end of the month our lives settled into a semblance of order. But during the month utter chaos reigned. For example, my wife would come home from work at night, and the phone would ring. She would run into the kitchen to answer it, but no one would be at the other end. This was because the kitchen phone was not ringing. Instead it was another phone on a different line that had just been installed that day. And it was still ringing.

Janet would hang up the kitchen phone and dash into our dining room and pick up the phone in there. Again nobody would answer. It was another phone that was ringing. It was the upstairs phone that had been installed in my son's bedroom the day before.

This daily mad dash for the telephone did nothing to improve my wife's mood after a hard day at the office. And it wasn't the only thing she faced when she returned to the house.

Musical Telephones

I tried to dedicate some of the telephone lines to the computers, some to my professional work, and some to the family. Except I kept changing my mind. So every couple of days, I called the phone company, and they came back and switched the phone lines. By the time Janet came home from work each night, all the phones had different numbers than when she left the house that morning.

Playing musical telephones was bad enough, but things got even worse. The computers began spending more and more time on the phones, and as they got on-line, they bumped family members off-line. For a brief period, almost

every time somebody would pick up a telephone they would find that a computer was already there, chatting to another computer.

Also, during the same period, we went through a couple of days in which we were shut off from the world. No one who called us could reach us because every time the phone rang, a computer would answer. Whenever a phone rang, somebody would race wildly through the house picking up receivers and crying "Hello! Hello!" But a computer would always be there first, whining its irritating high-frequency carrier tone at whoever had the misfortune to call us.

As I remember, handyman Howard was not available during this period. He must have been taking tests at school or something. So without his help, we just gave up. One day my wife arrived home from work, and the phone rang.



"Aren't you going to get it?" she asked. "Nope," I said. "The computer will answer it."

It did. Then it promptly hung up.

It was a very efficient way to handle calls.

Our Family's Electronic Mailboxes

After about a month, as I said, our lives gradually returned to normal. We kicked the computers off the phones at certain hours of the day, and we forbade them from answering the phones, unless we were sure another computer was making the call.

This was when we discovered electronic mailboxes. Electronic mailboxes and bulletin boards have been the biggest new thing in our family's life since Eric was potty-trained.

With Howard as our guide, we began setting up electronic mailboxes and posting bulletins on The Source, CompuServe, MCI Mail, the Plato Learning Network, and on bulletin board systems around the country. Then we filled the mailboxes and boards with messages. Going online was a marvelous experience—like launching helium balloons with our names and messages tied to them. We were reaching out to utter strangers, and we didn't know who would respond or where they might respond from.

And the strangers responded. We heard from a teenager in Wisconsin, an engineer in Texas, a retired teacher in Kentucky, and from many other people. And we wrote back.

To encourage more people to correspond with me electronically, I began listing all my mailbox user-identification codes on the river of paper mail that flows out of my office every day. And whenever I called anyone on the phone I made a point of saying, "You know, this voice stuff is really old hat. We should be talking computer-to-computer, not person-to-person. That's the way to really stay in touch."

When I did this, even more people responded. I got software publishers on the networks, teachers, parents, and distant members of my family. But I still wasn't satisfied. In fact, none of us were. Then I realized: We were all hooked. We had developed an appetite for electronic mail the same way we had an appetite for paper mail. The big difference was that with paper mail, you know you can count on only one delivery a day, six days a week. But with electronic mail, there's always the hope that the electronic "mailperson" has delivered a letter for you and it's waiting on some computer system right now. All you have to do is turn on your computer and check all your mailboxes. One of them may contain a letter.

Intra-Home Electronic Mail

This hunger for electronic mail became insatiable,

and it affected all of us, except for Mowie the cat. When we woke up in the morning, even before we made trips to the bathroom, all of us would dash to a computer and begin checking our mailboxes. After breakfast we would check our mailboxes again. As soon as my kids came home from school, they checked their mailboxes. When Janet got home from work, she checked her mailbox. And we all checked our mailboxes again at dinner, and before we went to bed.

We have a lot of friends, but we don't have enough friends who can spend all day writing us letters to keep our electronic mailboxes full. So we found that most of the time our mailboxes were empty, and this made us unhappy.

Then Howard showed up, listened to our problem, and came up with a great idea. "Why not," he said, "send letters to each other?"

At first this seemed like a crazy idea. Why should we send letters to each other? We lived with each other, saw each other, and talked with each other all the time. Why should we send mail to each other?

"Just try it," said Howard, "and I'll bet you like it."

He was right! We began leaving each other little notes on the computer, and pretty soon we were sending long letters. It was as if we had opened the floodgates. Apparently, we had a lot more to say to each other than we had been able to say face-to-face.

And no wonder! All the members of my family are so busy and going in so many directions at once that we rarely have the chance to sit down and casually ask questions like, "How was your day?" or "How is your life?" or "Is anything bothering you?" The moment rarely arises when two people in our family are in a mood or have enough time to have a conversation.

But now, using our electronic mailboxes, we ask these questions electronically and have electronic conversations—long, serious conversations unlike any we've ever had before. The mailboxes bring the different members of my family together by letting them talk when they have time or want to talk, and listen when they have time or are in the mood to listen.

In the past, it was rare that a family talker could find a listener when they had something to say. So they just didn't say it. And either it stayed bottled up inside and festered, or they simply forgot it. Now, when family members have something to say, they sit down at the computer and type it as a letter and send copies to each family member they want to say it to. And when those family members feel in the mood to get mail or have time to listen, they sit down at the computer and read their mail. And then they write back.

E-Mail Away From Home

We have all become so dependent on this new avenue for family communication that when Janet or I go out of town we take a portable computer just to stay in touch. When we get to a hotel room or pay phone, we log onto a network, check our mailbox, and send letters to the rest of the family. The rest of the family, meanwhile, logs onto the computer two or three times a day and writes long, chatty letters to the traveling parent.

This system is far cheaper than making long-distance phone calls, and it's also better. For example, the other night Janet called us from Washington, DC, where she had been attending a conference for a week. She had been in daily touch by electronic mail, but she called because she wanted to hear our voices.

She got to hear our voices, all right. And a whole lot more. I was running the vacuum cleaner when she called and ran to the phone without turning it off. The TV was blaring. Catie and Eric had their friend Alexa over, and the three kids were playing breakdancing music on the stereo while racing through the house hooting and hollering. When I yelled at the kids to quiet down, the doorbell rang. I told Janet to wait a minute so I could go to the door. Just then

the other telephone rang. Eric ran to get the phone and tripped over the vacuum cleaner and began crying.

When I got back to the phone a few minutes later, Janet was no longer in the mood to hear our voices. "I'll send you some E-mail," she said.

Epilogue

Most of these events happened during the summer and fall. Today our computer handyman, Howard, is a student down in New Orleans at Tulane, and things have calmed down around here considerably. The computers which fill the house still work, but not quite as well as when Howard was here.

We are still in love with electronic mail. We write to Howard every day on The Source, and he writes back. Janet and I have started sending each other electronic love letters. And Catie, Eric, and I have started exploring The Source's CHAT system and CompuServe's CB Simulator. Using these systems we can have an electronic conversation with over a hundred thousand people.

After our experience with using computers to communicate, I am firmly convinced that Howard was right when he said computers should talk to each other. He was right because when computers talk to each other, so do people. ©

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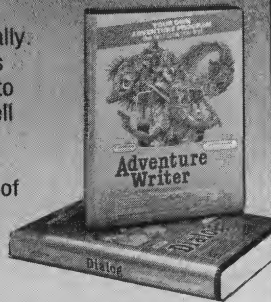
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Intelligent Appliances, Canadian Showers, Toddlers, And Mice

Recently I was Science Guest of Honor at the ninth annual Rovacon science fiction convention in Roanoke, Virginia. Among my duties were presenting science scholarships to young people, sitting on panel discussions about computers, science, and technology, and delivering a speech. One of the things I talked about was the career opportunities for young people in the future world of intelligent appliances.

You don't hear much talk about intelligent appliances. Personal computers are currently the hot item. Computer software alone has turned into a major business. Four thousand companies now make almost 30,000 programs. Last year people bought more than \$2.3 billion worth of software. Experts predict that by 1987 more than \$11 billion worth of software will be sold. That would make the computer software industry larger than the book publishing industry!

But what some people may not realize is that not all of the software sold in 1987 will be for desktop computers. The desktop computer is only one star in a constellation of intelligent appliances that will soon be found in people's homes, offices, and classrooms.

The key to the future is not the personal computer; it is the computer *microchip*—the little flake of silicon with thousands of transistors embedded in its hair-thin surface. Most computers now use dozens of these little microchips,

and they have allowed computers to shrink smaller and smaller. Like Alice in Wonderland, growing smaller has enabled computers to enter new worlds.

A Computer In Your Clothes

In the near future, all sorts of commonplace items will have microcomputers embedded inside them. And with computers come intelligence. We will have intelligent desks, intelligent walls, intelligent refrigerators, even intelligent clothes. With microcomputers inside our clothes we will be able to drape ourselves in intelligence.

We're already beginning to see microcomputers buried in people's bodies (in pace-makers and prosthetic limbs) or riding on a person's hip. Deaf people are using belt-mounted microcomputers to hear; people with impaired vision are using computers to see.

Intelligent appliances of the future will do more than just compute. They will also have sensors—electronic sense organs. Thus, they will be aware of the world around them. And they will have tiny voices to alert a person when something is wrong, or just to begin a conversation or give a status report.

Certainly there will be "computers" and "robots" (mobile computers with arms and/or wheels) in the future. But these will make up only a fraction of the crowd of intelligent ma-

chines that will move into our schools, offices, and homes.

Many of these machines still haven't been invented—or even imagined. Experts forecast a huge growth in the intelligent appliance industry. Intelligent appliances will open up tremendous career opportunities for young people entering the job market in the 1990s and the twenty-first century.

Opportunity Knocks

The opportunities will come in at least four areas. First, we'll need *inventors* to dream up these new appliances. Undoubtedly, there will be a new crop of millionaires in the late 1980s and 1990s who will get their start in basement and garage workshops.

Second, someone with business savvy and entrepreneurial abilities will have to *manufacture and market* these new intelligent appliances. As events in the personal computer industry have shown, this is the area where the biggest fortunes can be made.

Third, there is going to be a great need for *software developers* to program the appliances.

Fourth, there will be a need for *communicators and educators* who can make the appliances friendly, useful, and understandable to the average person.

The average person is already overwhelmed by talking cars, intelligent telephones, digital watches with 40 functions, and computerized bank tellers. But these machines are just the tip of the intelligent-appliance iceberg. We will soon be surrounded by babbling, rolling, and beeping intelligent machines.

To make matters worse, the machines will seem to be telepathic. They will be communicating at millions of bits a second by radio or infrared signals, and their conversations will be unseen and unheard. Human beings will rarely have a clue about what is going on within their own appliances' brains.

Older people, especially, will need help adjusting to this world. And this help can be turned into million-dollar careers for smart young people who can hold their elders' hands and gently lead them into the brave new world of intelligent appliances.

Bathroom Antics

In my column in the October 1984 *COMPUTE!*, I related a humorous anecdote about an experience I had while attending an educational computing conference in Toronto, Canada. I couldn't figure out how to turn off the shower in my hotel room. I wrote: "I clenched my teeth and coldly reasoned that if the shower didn't shut off by turning to the right, it must have a reverse screw

in the handle. This made sense. I was in Canada, wasn't I? Canada is a foreign country. In Canada they probably used reverse screws for everything."

To turn off the water, I reasoned that I had to turn the handle to the left. I did this and got a blast of hot water. At this point I realized that I was not dealing with a left-right handle, but a *push-pull* handle. I immediately pushed the handle, and the shower turned off.

Since the article appeared, I have received numerous letters from readers in Canada who have complained about my anti-Canadian article and my bad-mouthing Canadian showers. Here is an example.

"Dear Fred: In your article that was published in the October issue of *COMPUTE!*, you said 'I was in Canada, wasn't I? Canada is a foreign country. In Canada they probably used reverse screws for everything.' Well, in Canada we don't have reverse screws for everything. We use screws with right threads. I hope you were not saying this to be insulting to Canadians. I am a Canadian and proud of it. You might have offended several Canadians by that quote. I hope that you said it as a joke. Please send a reply. I am only 14 years of age and enjoy reading *COMPUTE!* and your articles. Sincerely yours, David Kirsch, Chilliwack, British Columbia."

In response to David's letter and all the others I received from Canadian readers, I'm very sorry if I offended you. I was poking fun at *myself*, not Canadians. I definitely did not mean anything negative about Canada or Canadian showers. It's just that often, things are done *differently* (and perhaps better) in other countries—including Canada.

(Maybe in my next column, just to set things right, I'll tell everyone about the shower I used in New Orleans at the Softcon Conference that squirted *mud* at me when I turned it on!)

Of Mice And Kids

I was talking the other night with Owen Greeson of MicroStuf, Inc. MicroStuf makes some wonderful products, including *Crosstalk XVI* (a communications program), *InfoScope* (a playful data base manager), and *Remote* (a program that lets you call your office computer from home—or anywhere else—and run it remotely like a main-frame computer).

Greeson and I were talking about ways to improve software to make it more "user-accommodating" (Greeson's term). Our discussion reminded him of his experience with his four-year-old daughter, Mikalee. Greeson had brought home an Apple Macintosh computer recently and had taught Mikalee how to use *MacPaint* (the drawing program) and the

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Macintosh mouse.

Mikalee really took to the mouse and became so adept at using *MacPaint* that she even began helping her father. Greeson said he had previously introduced her to a computer without a mouse, but she had balked at using the computer keyboard. Now, with the mouse, there was no stopping her. She had no trouble rolling the mouse around on the table, pushing the buttons, pointing at little pictures on the screen (icons), pulling down menus, and selecting commands. According to Greeson, the experience was so dramatic that he has become a "born-again icon believer."

I've told you this story because I've found the same thing to be true around my house. We, too, have a Macintosh, and my eight-year-old daughter Catie and my five-year-old son Eric love it. And I think that they love it because they can use the mouse and avoid the keyboard.

What do *you* think? Have your children had a chance to play with a mouse on a computer? If so, how have they done? Do you think that mice are a shortcut to computer literacy for young children? Please write and tell me your experiences:

Fred D'Ignazio
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THE WORLD INSIDE THE COMPUTER

The Home Computer Revolution: Another False Start?

Fred D'Ignazio, Associate Editor



In my recent columns I have written about the overselling of the home computer. (See "The Morning After: Anti-Computer Backlash And The Arrival Of The Mass-Market Home Computer,"

COMPUTE!, May and June 1984; and "Is The Computer A Home Appliance?," COMPUTE!, August 1984.)

Now it seems that a genuine backlash against home computers has appeared. In publication after publication, and on TV and radio, we hear that the "home computer revolution" was a fluke. Commentators and reporters tell us that computers are still too difficult, too finicky, and too expensive to be a mass-market "appliance." And, unlike the TV, the telephone, and the toaster oven, there is no compelling reason to own a computer.

There is some truth to all of these charges, and, collectively, they have chipped away at the

glossy high-tech image that home computers have enjoyed for the last couple of years. As a result, the glamour has worn off the home computer, and this has caused the industry to sag.

History Repeats Itself

But this is not the first time it's happened. In 1975, when the first computer kit (the Altair) appeared, there was a lot of discussion in the media about a "home computer revolution." This discussion was short-lived, however, because the first computers were strictly hobbyist devices. They had very little memory, almost no software, and were not built, distributed, serviced, or supported as consumer products.

The home computer hype started again in 1977 when Apple introduced its Apple II, Radio Shack came out with the TRS-80 Model I, and Commodore introduced its PET. Again we heard claims about how computers would soon be in everyone's homes. Unfortunately, these claims were just as premature as they were before. Like the machines before them, these new computers were suitable only for hobbyists and students as do-it-yourself educational devices.

We are now at the end of a third wave of claims that the home computer has arrived. This wave, like the others, has subsided and turned sour because our computer technology is still not mature enough to create a true, mass-market consumer product.

There have been three false starts in launching the home computer revolution, and there are sure to be more. Home computers are now in five million homes, but they're used daily in only a minority of those homes. It will be a long time before computers appear in 100 percent of people's homes and become a way of life like telephones or TV sets.

Fred D'Ignazio is a computer enthusiast, the father of two children, and the author of several books on computers for young people. His books include Katie and the Computer (Creative Computing), Working Robots (Hayden), The Star Wars Question and Answer Book about Computers (Random House), and Computing Together: A Parents and Teachers Guide to Using Computers with Young Children (COMPUTE! Publications).

Fred appears regularly as the "family computing" commentator on "The New Tech Times," a half-hour public-TV program on consumer electronics that airs weekly on over 240 stations across the country.

Fred's column appears monthly in COMPUTE!.

The Digital Utility Center

Experts predict that a real home computer will not appear until computers are integrated into all aspects of people's lives, including banking, shopping, working, communicating, and entertainment. A real home computer will not sit alone on a desktop and look like a typewriter plugged into a TV set. Instead, it will be a hybrid machine—part TV, part telephone, part video-cassette recorder, and part stereo system. It will be the brains of a general-purpose digital utility center that a family operates to hear music, watch movies and TV, make phone calls, control household appliances, and pay bills.

The home computer of the present is made up of awkward, ill-fitted, and confusing components. The day its components fuse together into a single digital utility center that is sold at discount supermarkets, it will truly become a mass-market device.

The digital utility center will come in a single box and plug into the wall with a single cord. The center's audio, video, and computer software will be uniform and standardized (in some kind of optical or magnetic format), and will play everything—from educational games to Bruce Springsteen to the latest Burt Reynolds movie.

All the recordings will be digital and capable of being stored on a single, high-density storage device. All programming will be in English and will consist of making simple choices from a menu of selections that appears on a screen and are read to the user aloud by the center's synthesized voice. Input will be from a keyboard, light pen, mouse, microphone, or touch screen, depending on the individual's preference. No technical knowledge whatsoever will be needed to operate the center. And the center will come with one- to five-year warranties, full service contracts, and modular, replaceable parts.

Like The Electric Motor

When the digital utility center arrives, the home computer will really be a mass-market appliance. But when computers have become digital utility centers, they will no longer be computers. To paraphrase Joseph Weizenbaum, a digital utility center to a computer is the same as a vacuum cleaner to an electric motor.

Before we see consumers going wild over digital utility centers, a lot of separate developments have to take place. Audio, video, communications, and computer hardware must evolve much further and become more integrated, digital, compatible, and inexpensive. Software for the separate devices has to be integrated under a single multimedia operating system and has to adopt a standardized storage and data interchange format.

In addition, the software must have a friendly, human-like mouthpiece that deals with us in our natural, spoken language and is not only user-friendly but also user-forgiving. The software will have to fill in the gaps in people's commands, correct their typos and misspellings, not let them make any serious mistakes, hold their hand as they work their way through a task, and anticipate what they will want to do next.

Most important of all, a mass-market home computer will require a reliable, universal communications network that links the digital utility center into very-high-speed satellite channels that support two-way instantaneous transmission of voices, music, video images, computer-generated pictures, text, and numerical data. This network, too, must be standardized, instantly available at the push of a CALL button on the digital utility center, and invisible to the user.

Only when such a network is in place will the digital utility center become popular with a majority of consumers. Only then will all the pie-in-the-sky promises of computer enthusiasts become possible.

Such a network will make it possible to do home banking, telecommuting, shopping at home, and attending courses and classes at home. People will be able to purchase all the new records, movies, computer software, and books over the network and have them downloaded into their local mass-storage device or into a portable computer that they can detach from the main unit and carry with them when they travel.

The Computer As Translator And Terminal

The lesson in all this is that our vision of the home computer has been too limited, and that's why we keep having false starts. Our vision has been limited by the fact that we are still too close to the computer's birth; we are still too familiar with the computer's early stages and functions to see what it may ultimately become.

We are only now beginning to move beyond the image of the computer as a computing engine that juggles numbers and processes paychecks. But we must go much further. We must see the computer as only a part of the digital revolution of all human media—voice, music, art, graphics, film, literature, and so on. As all science, art, technology, and communications are digitized, the computer assumes a central role as a translator among the media, and as a terminal linking human beings to the media and to each other.

The computer should enable the average person to enter information in any medium

(pictures, voice, text, whatever) and instantly translate it (at the discretion of the person) into any other medium—or into several different media. It should then enable the person to send the package to any other person. Likewise, anyone who uses a computer should have instant access to all media in any format they wish.

This sounds extremely abstract, so picture the home computer of the future as the United Nations Building. It will have two major func-

tions: translator and terminal. It will house all the disparate streams of digitized information representing all the different media, and it will translate them back and forth at the needs and whims of the user. And it will be plugged into the outside world (of cultures, peoples, nations, and institutions) and capable of vital two-way communication with that world in any language that is appropriate.

Next Month: Redefining Computer Literacy

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CAPUTE!

Modifications Or Corrections To Previous Articles

Atari Chess

Atari owners who use OSS DOS 2.20 from Optimized Systems Software must first select Q from the DOS menu to quit to DOS XL, then select T to go to cartridge before attempting to load this game from the December 1984 issue (p. 99).

Atari Acrobat

Due to a printing error in line 2030 of this game from the February 1985 issue (p. 60), the STRIG function to read the joystick button appears as STPIG. Also, lines 20115, 23500, and 27035 are too long to type in as listed. To enter these lines, simply omit all spaces between BASIC statements and variables. For example, POKE BC,14 can be typed as POKEBC,14.

Machine Language Multiplication

In Part 2 of the series on multiplication in the "Machine Language" column (p. 121, February 1985 issue), the high and low bytes of the product are switched in the example program. The last few instructions of the example should read as follows:

	LDA	\$0380
	ADC	\$0382
	STA	\$0380
	LDA	\$0381
	ADC	#\$00
	STA	\$0381
NOADD	DEX	
	BNE	NXBIT

Thanks to Karl Schmitt, Norman Sprock, and other readers who wrote in with the correction.

IBM Illegal Function Errors

A number of readers have reported problems with illegal function call errors in COMPUTE!'s graphics games for the IBM, such as "Horse Racing" (October 1984) and "Paratrooper" (January 1985). If you receive an Illegal Function Call error message in a line containing a PUT statement (such as line 1220 of Paratrooper), it most likely means that you have made a typing error in the DATA statements that define the graphics displayed by the PUT. When you see that error message in a line involving PUT, check all your DATA items carefully.

Proofreading The IBM Proofreader

Many readers have had problems getting the "IBM Automatic Proofreader" to work properly. The program is correct as listed, but if it's not typed in correctly, you may receive the cryptic message Error #2. The Proofreader traps all errors, even syntax errors. Instead of getting the usual "Syntax error in ..." message, you get the error number (2 is syntax error) with no hint as to where the error might be. To help you find your typos, change the 650 in line 140 to 0. This turns off the error trapping so you'll get the usual error messages if you have any errors.

Before using the Proofreader to type in programs, it's a good idea to test all the Proofreader commands, especially the SAVE command, just to make sure there are no bugs lurking in some obscure place in the program. To test the Proofreader's SAVE command, run the Proofreader and type in one line, say 10 REM. Now save this test program. If you didn't get an error message, you can safely type in a complete listing without fear of losing all your typing due to a bug in the SAVE command. When you think you have all the bugs out, type BASIC to exit the Proofreader, change line 140 back to normal, and save this bug-free version of the Proofreader.

THE WORLD INSIDE THE COMPUTER

Build A Computer In Your Mind

Fred D'Ignazio, Associate Editor



In my recent column, "The Morning After," in the May and June 1984 issues of COMPUTE!, I wrote about a new kind of programming that I believe people are beginning to do on their computer. I

called this "neoprogramming" to distinguish it from traditional programming in BASIC or Pascal and from "no programming" in which people treat the computer as a thinking machine and let it do their thinking for them.

In this month's column I'd like to explore neoprogramming and see how it can be related to computer activities that will help people develop thinking, learning, and communication skills that they can practice and refine using the computer, and that they can also take away from the computer and use, on their own, in all areas of their lives.

Neoprogramming

Neoprogramming can be defined as borrowing the most powerful ideas from programming languages and turning them into thinking skills that people can use, inside their head, in their daily life.

Another way to look at neoprogramming is as a toolbox that has three kinds of tools inside:

Fred D'Ignazio is a computer enthusiast and author of several books on computers for young people. His books include Katie and the Computer (Creative Computing), Chip Mitchell: The Case of the Stolen Computer Brains (Dutton/Lodestar), The Star Wars Question and Answer Book About Computers (Random House), and How To Get Intimate With Your Computer (A 10-Step Plan To Conquer Computer Anxiety) (McGraw-Hill).

As the father of two young children, Fred has become concerned with introducing the computer to children as a wonderful tool rather than as a forbidding electronic device. His column appears monthly in COMPUTE!.

- ☐ Tools to Help You Think
- ☐ Tools to Help You Learn
- ☐ Tools to Help You Communicate

These are practical tools that will be valuable no matter what people's goals are. Mastering these tools is more worthwhile than simply learning how to operate a computer.

Thinking, learning, and communication tools can be found in many places—in textbooks, in courses, in jobs, etc. But they can also be found, in a concentrated form, in the computer. And through extensive use and familiarity with these tools on a computer, people can learn how to use the tools to think better without the computer.

How Not To Use A Computer

Learning how to operate a computer, on its own, will not automatically guarantee people a successful career, help them learn how to use more advanced computers of the future, or give them thinking skills they can apply to other areas of their lives.

Also, it is possible to have a relationship with computers that actually deadens or stifles the ability to think. Many people, for example, use computers mechanically and passively. They spend their time in front of a computer entering information, making trivial, routine queries, or typing other people's documents.

The Thinking Appliance

There is a strong assumption in many people's minds that computers are labor-saving appliances. People ask, "What can I do on a computer?" But what they mean is, "What can the computer do for me?" The labor that many people hope computers will save is not mechanical labor but thinking labor. For most of us, thinking is work—work that we would avoid if we had the chance.

Many people would be happy (though few would admit it) if computers would do their thinking for them. In the near future, with the

advent of expert systems and friendlier computers, there is a great risk that computers will take over more and more of the thinking that people do. As a result, people and organizations will become increasingly dependent on computers.

Dumbo's Feather

For adults at work and at home, and for children in school, there is the risk that computers will become super calculators. When they want to do real work or thinking, they will, by habit, turn to the computer. The computer will become an adjunct to the person's mind. The computer will be like Dumbo's feather. Dumbo the elephant could fly because of his big ears, but he thought it was because of his magic feather. If he didn't hold on tight to his feather, he was afraid he couldn't fly. People may come to feel incapable of thought unless they do it using their computer.

The Computer Crutch

There is a real risk that many people will use computers as a crutch. They will expect computers to do their thinking for them, or they will be afraid that they cannot think without the aid of the computer. Either way, they will be tied to computers to help them carry on their daily affairs.

Also, if people use computers (or anticipate using computers) as a crutch, they will not get the most out of them. They will be using computers' powerful computational, communications, and information handling functions sloppily, indiscriminately, and inefficiently.

The Computer Lever

In fact, the computer is not a thinking machine, a magic feather, or a crutch. It is a complex lever. It amplifies our abilities to move information around, but we must position and guide it to get what we want.

In addition, we don't need to tie ourselves to the computer to use its lever. We can build the lever inside our head. The lever is, in fact, just an assortment of thinking skills embedded in general-purpose (BASIC, Logo, Pascal, Assembler, etc.) *procedural* languages and special-purpose (word processing, spreadsheet, file handling) *builder kit* languages. Once we have acquired these skills, we can employ them on the computer, or we can use them inside our heads. If we recognize and master these skills, we can get more out of using the computer, and we can become less dependent on it and more skilled, on our own, to think, learn, and communicate.

Building A Computer Inside Your Head

Burrell Smith, Apple's hardware wizard who

helped create the Macintosh, has written that he never just goes into a workshop and builds a new computer. Instead he first spends considerable time building mental prototypes inside his head. Burrell's prototypes are like a writer's rough drafts. Using mental prototypes, he takes a rough, simple idea and turns it into a cluster of complex ideas, and eventually into an advanced concept or design. Then he begins building the computer.

Burrell can create mental prototypes because he has a computer inside his head. Burrell has built this computer from an array of thinking skills he has learned from programming real computers and from his other experiences in life. These skills aren't mysterious, nor are they Burrell's alone. They can be mastered by anyone.

Environments For Thinking

Programming languages offer an environment for thinking—a place in which these skills can be learned, practiced, mastered, and then used. Learning a programming language offers an opportunity to explore new avenues of thought.

For example, if taught properly, BASIC, Pascal, Logo, and other languages can help people learn algorithmic thinking, how to break complex problems into smaller, simpler problems, and how to organize large quantities of information.

A word processing program can give people a feeling for the fluidity and mobility of words, ideas, thoughts, and knowledge. It can help them learn how to create several rough drafts, in quick succession, that sharpen an image, refine a concept, or lead to new ideas.

A spreadsheet program can help break a complex situation down into lists and arrays of smaller parts. It can display the whole forest and the individual trees in the forest, all at the same time. It can also reveal the relationships between all the parts.

A file-handling (data base) program can teach how to organize thoughts, feelings, experiences, and information. It can show how to group facts according to categories of likeness, how to sort and prioritize, and how to cross-reference facts that have certain traits in common.

Graphing languages, word processing languages, and telecommunications languages, singly or together, can teach how to better communicate feelings, ideas, and desires. They can teach how to use visual images and symbols, page layout and design, and grammar and style to communicate more effectively.

Magnets For Thinking, Learning, And Communication

Computers, like other media, can have a push-pull effect, depending on how people use them.

If computers are used inefficiently or inappropriately, they have to be pushed just to get meager, mediocre results.

On the other hand, computers can also exert a powerful pulling effect. They can be so attractive, so elegant that they will pull at the mind, like a magnet. They can almost seduce a person into performing a task or solving a problem.

Magnets And Road Maps

Computer tools can pull you like a magnet to the computer, but they can also become magnets inside your head that draw related information and ideas toward them. They can help you make sense out of chaos. They can let you mentally map out individual facts in some kind of logical, coherent, and practical order.

For example, what happens if you think about two things: a paper route and a spreadsheet? What kind of associations can you make? How might you map the paper route onto a spreadsheet?

You don't need to use a computer to do this exercise. Instead, you can perform what Albert Einstein called a thought experiment. You can build a mental prototype of a paper-route spreadsheet inside your head.

Associating spreadsheets and paper routes is not a dull, artificial, or mechanical activity. If you have the proper image, appreciation, and passion for using spreadsheets as a thinking skill, you start mapping the paper route onto the spreadsheet even before you know it. The spreadsheet, as a thinking tool, or metaphor, will draw your thoughts playfully and automatically. When you begin thinking about the paper route, your mind will unconsciously make an association with spreadsheets and figure out how the two are related.

For example, you might start thinking of the different houses on the paper route as columns. You might think of the people's names, addresses, telephone numbers, amounts owed, and your last collection date as rows in the spreadsheet.

You might also think of mapping the spreadsheet paper route into a data base in which you could quickly determine who owes you for the papers, who is the most overdue, and what might be the most effective collection route for you to follow on your bicycle or in your car.

In fact, you might never put all this information onto the computer. It might be too much trouble entering the information and keeping it up-to-date. But this doesn't matter as long as you have a model of the spreadsheet or the data base inside your head.

For many, many applications in life, building a mental prototype inside your head is enough.

It's not practical to go any further. The value of the computer skills is not that you use them on the computer, but that you can organize information, perform tasks, and solve problems better inside your head. This helps you become a better thinker, learner, and communicator on your own. You don't need a real computer around. You can carry one inside your head.

Learning Through Play

One of our greatest joys in life comes when we play—or when we feel we are playing. We might be working, but if it feels like play, we will be more motivated, more intense, and do a better job.

Passion and joy are not attributes of work but of love. And when we love what we are doing, it is never work. No matter how difficult the activity is, it feels like play.

I think that people can use computers to think playfully, learn playfully, and communicate playfully. The real joy of computing doesn't come from getting a job done faster, easier, or cheaper; it comes from making the job more challenging and more fun while you're doing it.

Are You A Neoprogrammer?

How is your relationship with your computer? Does your computer challenge you to think, learn, and communicate better? Does it make work more fun and interesting? Have you been able to take your computer skills with you when you leave the computer? Can you think on your own when your computer is turned off?

If you can, congratulations. Maybe you are a neoprogrammer and you don't even know it.

Whether you think you are a neoprogrammer or not, I'd like to hear your thoughts. What do you think about building a computer inside your head? Please write to me:

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THE WORLD INSIDE THE COMPUTER

Redefining Computer Literacy

Fred D'Ignazio, Associate Editor

Last month's column ("The Home Computer Revolution: Another False Start?") projected that the true home computer of the future would be a "digital utility center" that would act as a translator and a terminal, digitizing and uniting such technologies as computing, telecommunications, information storage, audio, and video. This month's installment examines the implications of these developments for educators, parents, and children.

Simultaneously Disappearing

Home computers are a long way from being digital utility centers. But they are moving swiftly in that direction. For that reason, it is important for us to keep this in mind when we teach children the computer skills they will need when they grow up. By looking at what the computer might become, we can better define the skills that our children should acquire.

This is a particularly important time to be looking ahead and examining the bundle of skills that are collectively defined as computer literacy. Personal computers have been around for almost

ten years, and the proponents of computer literacy have had time to develop dramatically different points of view.

The oldest camp of computer literacy advocates sticks staunchly to the view that to become computer literate you must learn how to program. Different groups espouse different programming languages, such as BASIC, Logo, Pascal, or even machine language.

The next group of computer literacy advocates claims that programming is a narrow discipline that only a few specialists should learn. Instead, we should be teaching our children how to use computer productivity tools such as word processors, database managers, and communications programs.

A third group of people feels that computer literacy is being oversold and is, in fact, a nonissue. They claim that computers are swiftly becoming user-friendly black boxes and are simultaneously disappearing inside other appliances and are becoming invisible (like electric motors). According to this group, soon we will no longer be dealing with computers. Instead we will be operating computerized telephones, word processors, and other computerized appliances. And as computers themselves disappear, so will computer literacy. With the new easy-to-use computerized appliances, computer literacy will be about as appropriate as telephone literacy, refrigerator literacy, or bathtub literacy. Even small children will discover how to use these appliances, just as they learn how to turn on the TV, open the refrigerator door, and learn how to ride a bicycle.

The Brick-By-Brick Approach

In light of the future potential and evolution of the home computer, I believe that all of the

*Fred D'Ignazio is a computer enthusiast, the father of two children, and the author of several books on computers for young people. His books include *Katie and the Computer (Creative Computing)*, *Working Robots (Hayden)*, *The Star Wars Question and Answer Book about Computers (Random House)*, and *Computing Together: A Parents and Teachers Guide to Using Computers with Young Children (COMPUTE! Publications)*.*

Fred appears regularly as the "family computing" commentator on "The New Tech Times," a half-hour public TV program on consumer electronics that airs weekly on more than 240 stations across the country.

Fred's column appears monthly in COMPUTE!.

above avenues to computer literacy are limited, fragmented, and incomplete. Surely a brilliant teacher or parent can take any one of the above approaches and introduce their children to all the possibilities of computers, but what are the rest of us to do?

In homes and schools today, most children are being introduced to computers by means of what my old friend Suzie Barnes calls the *incremental approach*. Every year the computer comes with new kinds of software that can do one or two new things, so children are taught that this is what computers can do. As computers can do more, we add that to the list of what we teach our children. "This is what a computer is," we tell them, "and this is what a computer can do."

For example, only a few years ago computers could do nothing, so simple hands-on experience was enough. Then computers came with programming languages, so that's what we taught our children. Now they come with productivity tools, so we teach them word processing and databases. Maybe next year they will all come with modems and communications software, so we'll teach that and call it computer literacy. And the year after that?

There is nothing wrong with this approach per se, since it does provide children with a hands-on familiarity with computers. But, on its own, it gives children an incredibly narrow, shallow, and passive image of how they can interact with computers. And, even more important, how they should view themselves—and their own minds—vis-à-vis computers.

We are teaching computers the same way we would build a house if we had no concept of the whole structure, and we built the house simply by placing one brick on top of another brick, and standing back every now and then and saying, "Now this looks interesting." We are defining the ultimate structure by the way it looks in its present, incomplete, and unrealized state. And we are focusing on the primitive materials and completely ignoring the architecture.

What's more, the architecture is not merely a new technology such as the digital utility center. Rather, it is our relationship to the technology. It is the way we use the technology, think about the technology, and react to the technology. Most important, it is the way the technology teaches us to think about ourselves—especially our minds.

Toward A New Definition Of Computer Literacy

In earlier articles in *COMPUTE!* I have written about new approaches to teaching our children

about computers. (See "Beyond Computer Literacy," *COMPUTE!*, September 1983; "How to Get Intimate with Your Computer," *COMPUTE!*, November 1983; and "Build a Computer in Your Mind," *COMPUTE!*, September 1984.)

I am worried that if most children's meager exposure to computers is limited to the incremental approach, they will grow up seeing computers only as automated tellers, digital watches, and point-of-sale terminals. Their image of computers will be so constrained and fettered that they will not see beyond these mundane, trivial uses of computers.

In most schools, students are learning that computers are programming engines and information processors. Programming, for example, even Logo programming, is taught in most classrooms as a mechanical skill, like mechanical drawing, carpentry, or automobile repair. Productivity programs are seen as the means to move data around—history data, biology data, economics data.

Programming and data processing are aspects of computers, but they are not the most powerful or central parts of computers. And they are not the most important computer skills our children can learn.

Experts are completely agreed on at least one point: that in the future our children will be using computers to work, to play, and so on. So the question is not whether our children will use computers but how well they use them. If our children use computers only to type text, perform tedious calculations, and prepare reports from databases, then they will be losing the chance for computers to make any significant contribution to their lives. The truth is, we don't need computers to do any of these things. We can do all of them already.

Why We Need Computers

Similarly, if computers are limited to automated drillmasters and electronic workbooks, their impact on young people will be trivial. We don't need computers to teach us facts, figures, and new subjects. We already have other resources, notably parents, teachers, movies, filmstrips, videotapes, books, audio tapes, and so on that do this rather well.

We don't need computers to teach us what to think about—that is being done already. Instead, we need them to teach us how to think better. And also how to learn better, and how to communicate better. And how to imagine better. And how to build a coherent, well-articulated code of ethics that helps us make sense of everything we learn, think, communicate, and imagine.

This is not that hard to do. All it takes is to use these "back to basics" goals as a yardstick when we teach computers to our children. This means, for example, that teaching programming is not enough. Instead we need to teach programming in a manner that will help children think, learn, communicate, and imagine better. And we can't teach productivity tools just for their own sake. We must gauge their utility by how well they help improve children's thinking, learning, communication, and creativity skills.

Our ultimate goal isn't computer literacy. It is to help our children cope with the world of the future by using computers as one of the resources at their disposal. We can help our children be more prepared for that world by stretching and broadening their image of the ways computers can be used and by encouraging them not to become too dependent on computers.

All of this discussion hinges on how we view computers. Are they separate minds that will one day do much of our thinking work for us? Are they pipelines to giant libraries of information that can provide us with a flood of new information? Are they mind enhancers and adjuncts to our brains? Or are they reservoirs of concepts, ideas, and thinking skills that we can learn, borrow from, and use to help us think better on our own?

For my own children, I prefer the final image. I don't want my children to see the computer as an office where they go to get work done, or a filing cabinet to retrieve information, or an annex to their brain that they have to plug into before they do any thinking. Instead I want them to see computers as a mental gymnasium that they frequently visit to strengthen their mental muscles. And they not only carry the beneficial effect from using the exercise with them all day long, but they can build their own gymnasium inside their head, so they can exercise their minds even when they are nowhere near a computer. I call these mental gymnastics "neoprogramming." And I believe they are the surest route to long-term computer literacy.

What Do You Think?

Is the digital utility center the revolution in home computing that we have been waiting for? Is neoprogramming the path to computer literacy? Write and tell me what you think.

Especially write if you disagree with me, or if you have experiences or examples you'd like to share. Here's my address:

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On The Road With Fred D'Ignazio

Bits, Bytes, And Black Sheep

Late last fall I attended the Bits & Bytes Show at the Disneyland Hotel in Anaheim, California. Bits & Bytes was the first national computer conference for kids, and I was there to cover it for *COMPUTE!* and for two PBS shows—"The New Tech Times" and "Educational Computing."

The show was a terrific success—especially for children. Thousands of kids came, played with the newest computers and robots, and got a chance to tell the bigwigs of the computer industry what they thought about their products. For example, one little girl, Kimberly Williams, returned from the show and wrote to the conference organizers: "Thank you for inviting my class to the computer show. It taught me and my friends a lot about computers. The computers were very learningful to my brain."

At the show, I gave a presentation on a favorite topic of mine: the ways in which a computer could become a "sandbox" for little children. I also made a few critical remarks about the programming language Logo. I said that although I enjoy programming in Logo, I don't think computer languages are especially appropriate for younger children because the rewards are not commensurate with the amount of effort required. Also, I said that the Logo environment is somewhat artificial, abstract, and not meaningful to a small child.

Angry Reaction

I had made similar remarks at other conferences, so I didn't expect the kind of reaction I got. What a shock! Ten minutes into my talk, people in the front row rose to their feet and furiously denied that anything I had said was true. They were teachers who had been teaching Logo to their classes at school, and they said their experiences had been exactly the opposite of my own.

After listening to their point of view for a few minutes, I asked other members of the audience if they agreed. By the end of the session (which turned into a free-for-all debate), I learned that there are many different points of view about Logo and very few points of universal agreement.

However, my feelings about the Logo controversy were strengthened the other night when I picked up a copy of an excellent Canadian magazine, *Computers in Education*, and read an article by Elias Leousis, a teacher and the founder of the first full-time computer literacy program at the elementary level in the province of Quebec. In the article, entitled "Black Sheep and Logo," Leousis wrote that "Logomania" is starting to become a cult. Leousis himself uses Logo to teach programming skills, but he worries about the absurd claims made by some of Logo's admirers. "As a result of such claims," he wrote, "disillusioned educators, having followed the 'Logo route,' may cause an anti-computer backlash, destroying all advances made in the area of introducing computer literacy in the education field."

People Inside The Machine

A few years ago, I wrote a book introducing computers to children. I interviewed dozens of computer pioneers, including J. Presper Eckert, who along with John W. Mauchley invented the ENIAC, the granddaddy of today's electronic digital computers.

I wanted to call the book *The People Inside the Machine* because I concentrated on the inventors and the excitement and joy they had received from working on computers. The book showed youngsters how real people with hopes, dreams, and frailties had built computers, step by step, over many, many years. By showing the people inside the ma-

chine, I hoped to encourage young readers to see a reflection of themselves inside machines of the future. The book's message was that inventions like the computer may require a dash of genius, but even more important are hard work, a playful imagination, devotion, and stubborn, mulelike persistence in following through with your own ideas and magnificent obsessions.

As it turned out, the book was retitled *Messner's Introduction to the Computer* (Simon & Schuster, 1983), but it's still oriented to young people. If you're a grownup who wants to read about the people inside the machine, I recommend Tom Mahon's new book, *Charged Bodies: People, Power, and Politics in Silicon Valley* (NAL, paperback, 1985). Mahon's account is one of the most honest, eloquent, and fascinating books I've read in a long time. You learn about computer technology—the semi-conductors, microchips, operating systems, and Winchester disks—but Mahon weaves the technology into the lives of the industry's famous and obscure pioneers, and has made what could have been a dry history of computers into a very interesting story.

Mahon doesn't pull any punches, either. He devotes equal attention to the dark side of computers as well as the light side. And he does it all in a vivid style reminiscent of Tracy Kidder's Pulitzer Prize-winning *Soul of a New Machine* (Little, Brown, 1981).

This book is an excellent primer on computer technology and the computer industry, and it will make a good computer literacy text for high school and college introductory courses on computers. ©

Fred D'Ignazio loves to get electronic mail. Here are his electronic mailboxes: The Source (BCA638); Compu-Serve (75166,267); MCI Mail (Fred D'Ignazio); and EasyLink (62856637).



The World Inside the Computer

Fred D'Ignazio, Associate Editor

Here Come The Toy Robots!

Toy Fair was a vertical conference staged this spring in three Manhattan skyscrapers, buffeted by howling, blustery winds and giant raindrops that appeared to be falling sideways. I attended Toy Fair to preview the new high-tech learning toys and robots that will appear on toy store shelves this fall. Hasbro Bradley and Tonka Toys have the most widely known robots—the Transformers and the GoBots. But there are also many other toy robots, including:

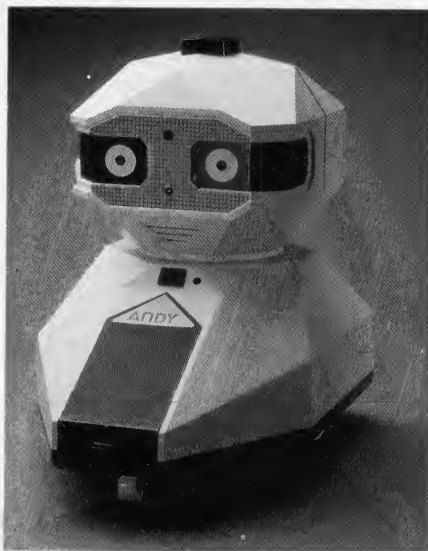
- Maxx Steele & Robo-Force Robots from CBS/Ideal Toys.
- Robotix construction kits from Hasbro.
- "Bot" family of robots from Tomy—The Pocketbots, Dingbot, Flipbot, Chatbot, Owlbot, Verbot, Omnibot, and Omnibot 2000.
- Tomy's Robo-Strux robot construction kits.
- MOVIT family of build-it-yourself robots from OWI.
- Petsters (Dogster & Catster), Compu-robot, Andy the Personality Robot, and Talkabot from Axlon.
- Elami "robot friends" from North American Robotics.

I think robot toys will become the first real robots to enter people's homes as true consumer products. Toy companies are putting their robots on the market only after extensive product testing for safety, ease of use, durability, and play value. They also realize that robots are unlike other appliances in the home and are more like toys. Today's robots have little functional value, but, as a toy, they can provide hours of enjoyment and learning. The real magic of robots is when they appear lifelike, "petlike," and loaded with personality.

The more costly robot toys, like Omnibot, HEROjr (also available in

kit form), Maxx Steele, Andy, and Elami all come with distinct personalities. HEROjr is the most lovable and absent-minded of the robots. He recites nonsense rhymes, mistakes dogs and cats for humans, orders hamburgers and fries from the bathroom sink, and sings "Old MacDonald Has a Robot" to the wastepaper basket.

Children can play games like Moon Ball with Maxx Steele and teach him to play their own musical compositions. They can break dance with Omnibot (using the cassette recorder built into his chest). And they can play robot-tag with Elami and go on make-believe maze adventures like "Journey to the Crystal Mines."



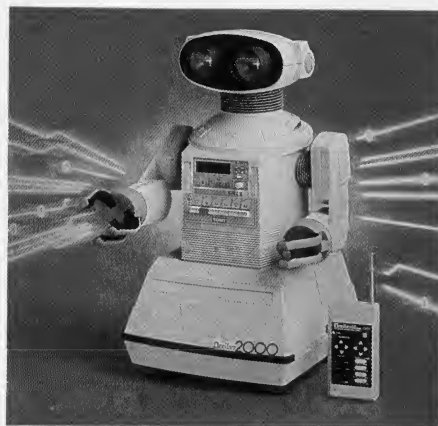
Andy the Personality Robot has a programmable personality and can be controlled with a Commodore 64 or Atari home computer.

Even the inexpensive robot toys have personality. The Transformers, the GoBots, and the Robo-Force action-figure robots all have names, comic books, and heroic storylines that take children (and parents) on life-or-death missions to faraway galaxies and the remote future.



Maxx Steele is a two-foot tall robot with a 150-word vocabulary and 20 preprogrammed phrases. His claw is nearly as flexible as a human wrist.

The builder-kit robots—like the Movits, the Erector Set Maxx Steele robots, the Robo Strux, and the Robotix—are appealing because they let you and your children build a robot on your own. And, although they are challenging, the kits take only a couple of hours to assemble, and require no soldering or special skills.



Tomy's Omnibot 2000 has a remote controller and retails for about \$500. ©



On the Road With Fred D'Ignazio

Fred D'Ignazio, Associate Editor

Buying The Right Educational Software

What types of educational software are people buying? What kind of software do they need?

In the opinion of many educators, the most important use of the computer as a learning tool lies in improving students' thinking skills through the use of programming languages like Logo; simulations and builder kits like *The Whatsit Corporation* (Sunburst) and *Operation: Frog* (Scholastic); microworlds like *Rocky's Boots* and *Robot Odyssey I* (The Learning Company); and problem-solving software like *The Pond*, *SemCalc*, *The Factory*, and *Geometric Supposer* (Sunburst).

But the sales of these products are dwarfed by the sales of drill and practice programs and learning games. A quick glance at a recent *Billboard* chart of the ten best-selling educational packages shows that eight of them are drill and practice programs and the remaining two are learning games. Of the drill and practice programs, two teach how to type, three teach basic math skills, two help students practice for the SAT college-entry exam, and one teaches basic vocabulary and spelling skills.

A look at TESS (The Educational Software Selector), published by the Educational Products Information Exchange and the Consumers Union, shows the same dominance of drill and practice programs. Of the 7,000 programs listed in TESS, almost 70 percent are drill and practice programs, and only 8.3 percent are simulation and problem-solving programs. (For more information about TESS, write to EPIE, P.O. Box 839, Water Mill, NY 11976.)

Most experts in educational computing have been critical of drill and practice programs for years. And most experts agree that

problem-solving and simulation software is the most challenging and interesting software for anyone learning on a computer. If this is true, why are companies producing so much drill and practice software? And, more importantly, why do people prefer it?

Wary Adults

The answer is that most parents (and many teachers) are not ready for new kinds of software that teach new skills in new, unfamiliar ways. They don't understand how the programs work or what they're supposed to teach, or why it's important, and they don't see where the programs fit into their children's learning. And since they don't see a need for the programs, they don't buy them.

This is a natural reaction. For most people, computers are still a strange, almost alien, new medium. Many parents are still uncomfortable having a computer in their home. And many teachers, too, feel privately fearful of computers. They see the computer as a threat—a means to automate them out of a job. The more the computer's role in the classroom grows, the more they see their own role being eroded.

In addition, problem-solving and thinking-skill software is an unfamiliar, new application of computers. We have a new medium (computers) trying to teach new concepts (logic and thinking skills) using new methods (microworlds, simulations, etc.). This is too much novelty for the average consumer—whether that consumer is a parent or a school system. As a result, most consumers are buying drill and practice programs and learning games because at least this way they see the computer teaching practical, necessary, and familiar skills—using a nonthreatening, understandable approach. And in the

classroom, since the skills are familiar, the programs that teach them are more easily integrated into a teacher's lesson plan and curriculum. A program that teaches a child some spelling words can slip effortlessly into a curriculum, but what does a teacher do with a program that teaches a child how to think?

For the present, most parents will be buying and using drill and practice software and learning games, and ignoring problem-solving and simulation software. Does this mean that companies should stop producing these more challenging, yet less successful programs? Hardly. Instead, educators and software companies need to launch a major effort to communicate to parents and teachers the importance of the new kinds of software. To do this, software companies must demonstrate to parents and teachers why learning these skills is important, and how the software fits into their children's learning curriculum. ©

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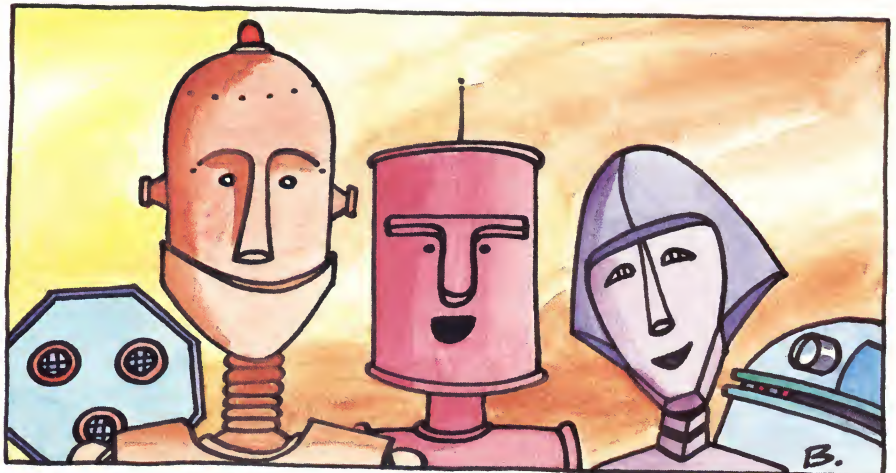
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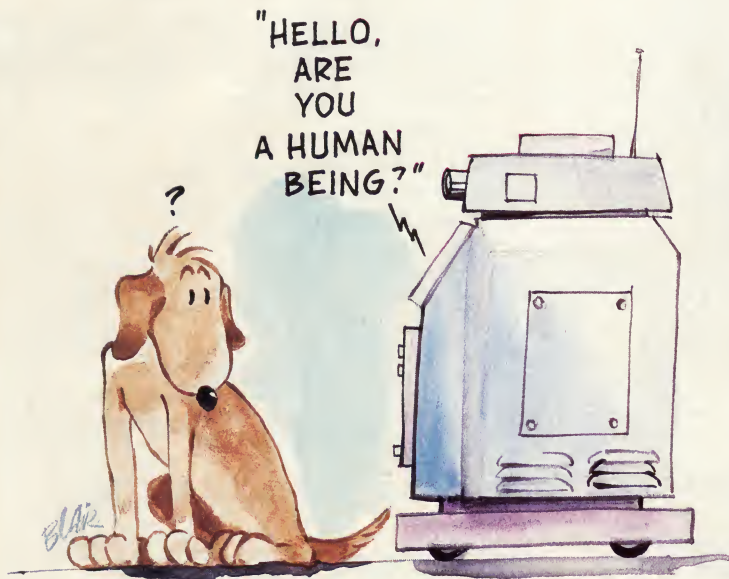
A host of new robots—educational, recreational, and even some you can program with your 64—visit Fred D'Ignazio's robot hotel.



COMPUTING for families

Our Robot Hotel

Fred D'Ignazio, Associate Editor



The Mad Scientist

When I was a kid, I had a huge, walk-in closet in my bedroom. When I entered the closet, I became a mad scientist and the closet became my lab. In the lab were all sorts of old, broken-down machines, including a copier, a bed pan, and a motorcycle motor. I spent dozens of hours tucked away in my lab—hammering, soldering, and bolting the machine parts together trying to build a walking, talking robot.

My blueprints were the pictures in comic books, fantasy tales, and science fiction movies I saw late at night when my parents thought I was sleeping.

Despite my high hopes and hard work, I never built my robot. That was 25 years ago, but the fascination for bringing a machine to life still lingers. And judging from the interest in the real robots on the market, there are millions of you out there who love robots as much as I do.

To get ready for this article, I invited all the robots I knew to visit my house. There are so many robots here, now, that they have turned the house into a hotel—a robot hotel.

Robot King Of The Mountain

A real contender for robot king of the mountain is Hubot from Hubotics. Hubot costs between \$3,600 to \$4,000 and is a big guy—almost five feet tall and weighing 150 pounds. To keep him from running over your family cat, there are two sets of ultrasonic sensors—on his chest and at the base, just above the floor—that help him “see” where he is going.

Hubot is really a mobile, talking, playful appliance. He has a built-in computer with 64K of memory and a disk drive. He has a built-in video game, a radio/cassette player, and his screen doubles as a monitor and a TV. Hubot’s makers see him as a “Man Friday”—a programmable vacuum cleaner, playmate and tutor for the children, watchdog when you’re not at home, and personal secretary for mom and dad.

Robot Pets

Next, we come to another group of guests in our robot hotel—the robot *pets*: HEROjr from Heath Company for \$600 (as a kit) and \$1000 (assembled); Maxx Steele from CBS Toys for \$400; and Omnibot from Tomy for \$300.

All three are programmable, and HEROjr comes with sound, light, infrared and ultrasonic sensors that give him the ability to react to the outside world.

These robots *can* make themselves useful—for example, you could program them to carry a soda to you from the kitchen (if someone got it out of the refrigerator first). And HEROjr has a security feature that turns him into a burglar alarm. But these are not serious servants. They are robot playmates, companions, and tutors.

Maxx Steele and HEROjr play games like Moon Ball, and Cowboys and Robots. Omnibot has a cassette player, and HEROjr and Maxx have voices; to make Omnibot talk you speak through his remote controller and your voice comes out of his chest. My kids love this feature

1



1) Hubot—"king of the mountain" (Hubotics); 2) Maxx Steele (CBS Toys, Ideal); 3) Dingbot, Verbot, and Omnibot (Tomy); 4) HEROjr (Heath)

2



3



4



for games of hide 'n seek and tag. HEROjr sings and recites poetry. And all three robots have clocks and calendars so they can remember birthdays and sound an alarm when your favorite TV show is about to come on.

The Educational Robots

The next class, the *educational robots*, includes the Nomad from Genesis for \$180; the Turtle Tot from Harvard Associates for \$400; F.R.E.D. from Androbot for \$500; TOPO from Androbot for \$1500; and HERO from Heath for \$2000.

All of these are programmable. The Nomad, the Turtle Tot, and F.R.E.D. can be programmed in Logo. The Turtle Tot and F.R.E.D. hold a pen so they can draw designs on paper.

Also, each of these can be attached to the Commodore 64. This is an important feature since you can create a whole library of programs on the computer, then send them one at a time over a cable to your robot.

And remember, *software* is as important to robots as it is to computers. However, unlike home computers, most of the home robots on the market have little or no ready-made software—the programs and commands that make the robot perform even the simplest activity like turning in a circle. That means you have to write your own or wait for robot software companies like Computer Magic, which makes software for the Hubot and the Tomy robots, to create programs you can buy. (Computer Magic plans to make Commodore 64 software for all the popular, low-cost robots. In many cases, the robot companies will distribute Computer Magic's software under their own label.)

The high-end educational robot, HERO, is a complete robot laboratory. It makes a great project for a family or school class. It may take you up to 90 hours to put it together, but you'll learn all about robots, including robot sensors, arms, motors, mobility, microchips and electronics, and how to program them.

Robot Toys

Next come the *robot toys*. At the very low end are the Robo Force Action Figures from CBS Toys for \$5 to \$6, the Dingbot and Flipbot robots from Tomy for \$10, and the robot transformer watches from Takara for \$14.

The Robo Force robots are for very young children—seven and under. They come with comic books, good guys and bad guys, and a dramatic, imaginary scenario that sweeps over an alien planet. They are safe, easy for young children to manipulate, and are great food for the imagination.

While Dingbot and Flipbot are nothing more than a motor on wheels, they are undeniably cute. And the robot watches motivate kids to learn to tell time.

Probably the best buy, for the money, are the Transformer robots from Hasbro and the GoBots from Tonka. For \$2 to \$10 your children get hours of play while improving hand-eye coordination and fine motor skills, and exercising their imagination. And if you think transforming one of these little creatures from car to robot is trivial, you should try it yourself.

I couldn't do it. Even my mechanic at the filling station couldn't do it. But my five-year-old could.



1) Elami and Elami Jr. (North American Robotics); 2) GoBots (Tonka); 3) Transformers (Hasbro); 4) Robo Force Action Figures (CBS Toys, Ideal); 5) Memocon Crawler (OWI)

Educational Toy Robots

Last on the list come my favorites—the *educational toy robots*. These are authentic enough to give you an idea of how robots are made and how they work, yet they are extremely inexpensive. They include the Erector Set Maxx Steele from CBS for \$12; the Robotix Robot Construction Kits from Hasbro for \$20 to \$30; the Armatron from Radio Shack for \$25; the remote-controlled Erector Set Maxx Steele from CBS for \$40; the voice-controlled Verbot robot from Tomy for \$65; the Movit family of robots from OWI that range from \$25 to \$75; and the Elami (pronounced EL-ah-mee) robot family from North American Robotics for \$130 and up.

The only Elami robot currently available is the 12-inch high steel and plastic Elami Jr. that runs at two speeds and moves equally well on tabletops and floors. It comes assembled, for \$130, and has several attractive features, including easy programmability (with 4K of memory for programs); an animated LCD face with four expressions; a flat, membrane command panel on its chest for programming; a 194-word vocabulary spoken in a humanlike voice; and two sen-

sors: an infrared sensor above the command panel, and a bumper sensor at its base. The robot's developer appears committed to making the product safe and reliable, and supporting it with educational materials, activities, and software.

One of the Movit robots, the Memocon Crawler, can be converted into a real, programmable robot, at much less cost than the Elami Jr. You can buy a \$40 interface (cable, disk, and manual) kit for the Crawler and hook it up to a 64. Then you can write programs and send them to the robot. As you write the programs, the robot obeys them, one at a time. Then, when you unplug the robot and put it on the floor, it obeys the entire program.

Robot "creatures" that you build from a Hasbro/Bradley Robotix Construction Kit can become real computer-controlled robots with the aid of the \$90 Kelp (for "Kinetic Helper") Board from Crabapple Systems in Portland, Maine. This allows you to build any kind of robot you want out of Robotix components, then connect up to eight Robotix three-volt motors to your 64, and program your robot in BASIC. The 64 version of

Robots And Robot Companies:

GoBots (\$2-\$3)—Tonka Toys, 4144 Shoreline Blvd., Spring Park, MN 55384, (612) 475-9500
Transformers (\$3-\$10), Robotix (\$20-\$30)—Hasbro, 1027 Newport Ave., Pawtucket, RI 02861, (401) 726-4100

Robo Force Action Figures (\$5-\$6), Maxx Steele Erector Set (\$12), Maxx Steele Remote-Controlled Erector Set (\$40), Maxx Steele Programmable Robot (\$400)—CBS Toys (Ideal), 1107 Broadway, New York, NY 10010, (212) 675-6100

Dingbot (\$10), Flipbot (\$10), Verbot (\$65), Omnibot (\$300)—Tomy Corporation, 901 E. 233rd St., P.O. Box 6252, Carson, CA 90749, (213) 549-2721

Robot Watch (\$14)—Takara Toy Company, 200 Fifth Ave., Rm. 660, New York, NY 10010, (212) 989-0400

Armatron (\$25)—Radio Shack (3500 stores around the U.S.)

Movit Family of Robots (\$25-\$75)—OWI Incorporated, 1160 Mahalo Place, Compton, CA 90220, (213) 638-4732

Elami Jr (\$130)—North American Robotics, 4251 N. Federal Highway, Boca Raton, FL 33431, (305) 368-8118

Nomad (\$180)—Genesis Corporation, P.O. Box 152, Hellertown, PA 18055, (215) 861-0850
Turtle Tot (\$400)—Harvard Associates, 260 Beacon St., Somerville, MA 02143, (617) 492-0660

F.R.E.D. (\$500), TOPO (\$1500)—Androbot Inc., 550 Charcot Ave., San Jose, CA 95131, (408) 262-8676

HEROjr (\$600 kit/\$1000 assembled), HERO (\$1000 kit/\$2000 assembled)—Heath Company, Benton Harbor, MI 49022, (616) 982-3678

Hubot (\$3600-\$4000)—Hubotics Corporation, 6352 Corte del Abato, Carlsbad, CA 92008, (619) 438-9028

Interface Boards/Cables:

Kelp C64/Robotix Interface Board and Software (\$90)—Crabapple Systems, 118 Commercial St., Portland, ME 04101, (207) 772-8610

C64/Movit Interface Cable and Software (\$40)—OWI Incorporated, 1160 Mahalo Place, Compton, CA 90220, (213) 638-4732

Robot Software:

Computer Magic Ltd., 18 East Mall, Plainview, NY 11803, (516) 694-8960

Robot Books:

The Everyone Can Build A Robot Book by Kendra Bonnett, Gene Oldfield, and the editors of DIGIT Magazine (Simon & Schuster, \$8.95, 1984)
The State-Of-The-Art Robot Catalog by Phil Berger (Dodd, Mead, \$12.95, 1984)

If I Had A Robot: What To Expect From The Personal Robot by Nelson B. Winkless III, (Dilithium Press, \$9.95, 1984)

Working Robots by Fred D'Ignazio (Hayden, \$7.95, 1984)

the Kelp board should be available as you read this. Call Crabapple Systems directly (see below) for inquiries or orders.

The voice-activated Verbot robot is also special because, with software from Computer Magic, it can be programmed from a 64; and can be used for children with speech disabilities and by children who don't speak English. As long as children can make a sound, they can train Verbot to obey them.

How To Build A Robot Of Your Own

Many of you kids out there probably want to build a robot, just as I did. Now you have the chance to learn how to build robots the smart way—with robot kits. You can begin with little robot toys like the Transformers and GoBots. You can graduate to the erector set robots and the Robotix construction kits. Then you'll be ready for the Movit robots. The Movit kits have dozens of pieces and take hours to build, but they teach you a lot about robot mechanics and electronics. With any of the more complicated kits, it's best to get help from parents and teachers. It's easier and quicker to build a robot as a team and much more fun.

After the Movits, you may be ready to tackle a full-scale robot like the HERO or HEROjr. Or you may wish to build a robot of your own design. But before you do, stop and do a little research with books like the *Everyone Can Build A Robot Book* from Simon & Schuster; *The Robot Catalog* from Dodd, Mead; *If I Had A Robot: What To Expect From The Personal Robot* from Dilithium; or my book, *Working Robots*, from Hayden.

Robots Are Special

For you parents and teachers, don't be disappointed that I didn't show any robot maids or butlers. These machines will arrive, not as robots, but as *intelligent appliances*—dishwashers with arms, ovens with voices, and smart vacuum cleaners that wander around the house unattended while they suck up dust and crumbs.

We could all use more help around the house, but it will come from these intelligent appliances, not from robots. Robots are special. We humans find robots more fascinating than any other machine because, unlike other machines, robots appear lifelike. And there is a danger that robots will lose this special charm if we strip them of their lifelike qualities and turn them into common, dull machines like can openers or toasters.

Who loves robots the most? Kids. As parents and teachers, our job is to recognize the fantastic appeal that robots have for kids and use it constructively to help them learn important skills, and to spark their imagination. This can be accomplished with a \$2 robot toy as easily as with a full-blown \$4000 robot appliance.

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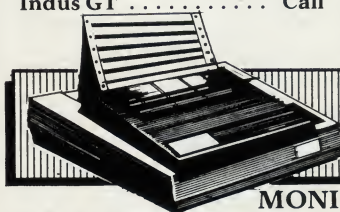
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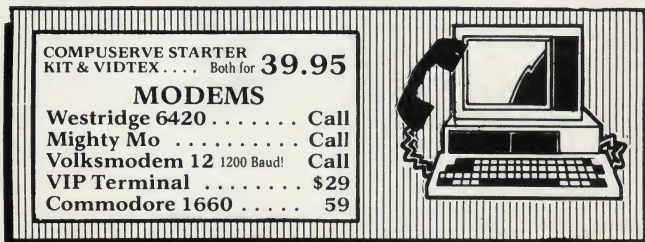
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COMPUTING for families

A Visit To Eric's Classroom

Fred D'Ignazio, Associate Editor

The Land Of The Lilliputians

Recently, I visited the classroom where my son Eric will begin the first grade this fall. Parents of this year's kindergarten class were encouraged to come and see how first graders spend their day.

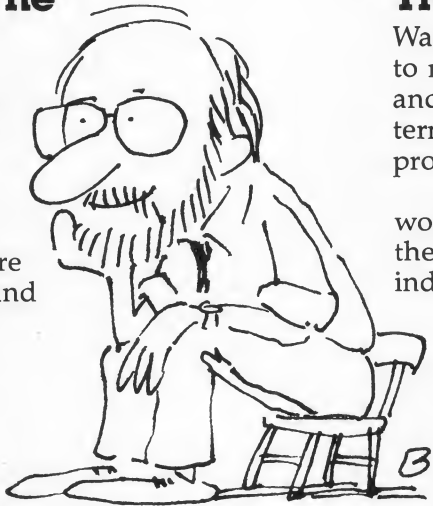
The first thing I noticed in the classroom was how big I was and how little everything else was—people, chairs, tables, drinking fountains, and bookshelves. I'm a small person, so it was kind of a shock to feel like Gulliver in the wee land of the Lilliputians.

When I sat down in one of the tiny chairs recommended by the teacher, I sat down cautiously and nervously, fearing that I would crush the puny thing with my gigantic five foot seven body.

After a few minutes of acute discomfort, however, I began to relax. It wasn't long before I overcame my shyness and began roaming around the room, asking children what they were doing, examining work materials, and peeping over the teacher's shoulders as she conducted her reading groups.

I've often thought of schools as "learning factories." I saw kids going to school in massive numbers across our country, to process huge quantities of facts and basic skills.

When I visited Eric's school, I found out that I was right! Schools are factories. I was amazed, in the short time we were there, at the amount of material—the number of pieces of paper—those kids processed. It was exhausting just watching them.



The Paperless Classroom

Watching all those kids process paper, it occurred to me how neat it would be—both for students and teacher—to have little networked computer terminals at every table for the kids to do all this processing on.

I noticed that the kids already had their own workstations and were encouraged to work at their own pace. Computers could augment this independence and self-paced learning. Instant feedback, with helpful suggestions, encouragement, and a review of the lesson only a keystroke away.

And what a boon this would be for the kids' teacher who, I noticed, was accumulating stacks of paper. Instead of spending hours correcting papers, she would have time to look at summary statistics of the children's progress, or recall a transcript of each child's work, in any subject, and examine what was especially hard for the child to master.

What Software Is Available Now?

Is this fantasy of mine even close to happening in real classrooms with real teachers and children?

The right kind of software (drill-and-practice) is available. According to the 1985 edition of *TESS (The Educational Software Selector)* published by EPIE (Educational Products Information Exchange) and the Consumers Union, of the 7000 educational programs on the market, almost 70 percent are drill-and-practice. (For more about *TESS*, write: EPIE, P.O. Box 839, Water Mill, NY 11976; or call 516-283-4922.)

And it looks like teachers (and parents) are responding. A recent issue of *Billboard* shows that eight of the top ten best-selling educational programs were drill-and-practice. (The other two were learning games.)

But does this mean, then, that we're close to the paperless classroom?

The answer is a resounding NO. And there are many reasons why not. First, the quality of

this software (as journalists and educators so widely lament) is mostly very low. According to *TESS*, only four of ten educational programs are even worth buying, and one or two of these are simulation or problem-solving programs, not drill-and-practice.

Second, and perhaps more important, very little of the drill-and-practice software fits the teachers's or child's needs. Most programs on the market exist as one-shot products that drill children in a very narrow area. When a teacher looks at educational programs, it seems she's faced with an array of mediocre products that cannot easily be integrated into her curriculum. So what is she to do?

It looks to me like she has three choices. First, she can experiment and try to squeeze available programs into her curriculum, while recognizing that in most cases they'll be a poor fit. Second, she can wait until software and educational publishers link forces and produce quality software that's fully integrated into her curriculum. Or third, she can develop her own materials.

Available Programs

Fortunately, software on the market is improving. The CBS Success with Math Series, the Davidson & Associates programs, Scarborough's *MasterType*, Simon & Schuster's *Typing Tutor III*, and Springboard's *Early Games* are examples of quality software that make the computer a learning medium. Although these are basically narrow, one-skill programs, they are well-designed, pedagogically sound, and quite appealing. Also, they offer ways to custom-fit the lessons to a teacher's needs, and they offer limited evaluation and progress-report facilities for each learner.

In addition, a new generation of powerful, yet easy-to-use productivity software for children is available: word processors like *Quill* from D.C. Heath, *Magic Slate* from Sunburst, the productivity series from Grolier (*Friendly Filer*, *EduCalc*, and *Easy Graph*), and Scarborough's *MasterType's Writer* and *MasterType's Filer* are examples of this new generation.

Computers In The Curriculum

However, even if software quality improves, we still need to see an explicit connection between a teacher's curriculum and the programs she has available.

As a start, textbooks should refer to specific software and vice versa. Computer disks and computer-learning units should be included in every textbook. A teacher won't be forced to use these, but if she chooses to, they should enable her advanced students to explore a topic in more depth, and provide self-paced practice for those

who need more work.

On the other hand, new curriculum-based (or at least, curriculum-supportive) programs are appearing on the market. One of the best is the family of "Intelligent Tutor" programs produced by Intelligent Software (9609 Cypress, Munster, IN 46321; 219-923-6166), which include five math programs targeted to older children: *Algebra I*, *Geometry*, *Algebra II*, and *Trigonometry* parallel the standard high-school math curriculum; and *SAT Math* helps students prepare for the math portion of the SAT exam.

A Successful Alternative

More and more teachers are also choosing the third route and creating their own software and materials for integration into their curriculum. This is not as simple as it sounds. Few teachers, alone, have the time or expertise to develop a battery of materials or programs and then plug them into their daily schedule.

But an entire school system—in a city, a county, a state, or province—can do this. I found this out when I visited the city school system in Vancouver, British Columbia. Under the active guidance of Mike Northy, the District Elementary Computer Consultant, the school system is developing a rich library of programs, books, and other materials to feed into the city's elementary schools. (For more information, write to Michael L. Northy, Education Services Group, Board of School Trustees of School District No. 39 [Vancouver], 1595 W. 10th Avenue, Vancouver, B.C. V6J 1Z8 CANADA; or call 604-731-1131.)

The Teacher: The Real Key

The Vancouver program is successful because Mike has patiently worked with individual schools and parent-teacher associations to develop grass-roots support, and because the city is big enough to provide a pool of talented teachers who can jointly develop the materials and enough classrooms, teachers, and students to make it all worthwhile.

But the real key to Vancouver's success, I believe, is the teachers themselves. My old image of the "factory classroom" placed the teacher as supervisor or foreman. She does act as a fact-and-skill-processing manager, but there are other things she does that far transcend this role and make her an invaluable part of my son Eric's (and all children's) school experience. Most important of all is her style of teaching and the warm, person-to-person attention I saw one of the teachers lavish on each child in her class when I visited Eric's school. Now, after visiting Eric's classroom and seeing his future teachers in action, I'm convinced that a teacher is much, much more.

COMPUTING for families

A Journey Through The Land Of The Buddy-Bots

Fred D'Ignazio, Associate Editor

Software Fairy Tales

Software developers looking for new approaches to early-learning software could spend a profitable afternoon visiting and browsing through a good children's bookstore.

If they wander through a bookstore, they'll notice that most paper-and-print materials for young children are centered on *stories*. Even the youngest children are fascinated by stories about other children, animals, and creatures—both realistic stories and make-believe stories. Often these stories carry significant educational messages, but the messages are artistically hidden within a strong plot, and expressed through the medium of lovable, realistic characters.

I'd like to see more programs designed along these same lines. We've had enough programs for young children with weak, poorly developed story lines and insipid characters. What we need now are *software fairy tales*—stories and characters that "come alive" when the child turns on the computer.

Not For Children Only

Most families with little children have at least a small collection of children's books. And some of those books are well-worn, well-read, and special.

When my children, Catie and Eric, were younger, they had several favorite books and several favorite authors (and illustrators). Among their favorites were Judith Viorst (*Alexander and the Terrible, Horrible, No Good, Very Bad Day*), H. A. Rey (*Curious George*), Ludwig Bemelmans

(*Madeline*), Maurice Sendak (*Where the Wild Things Are* and *In the Night Kitchen*), and Mercer Mayer (*One Monster After Another* and *There's a Nightmare in My Closet*).

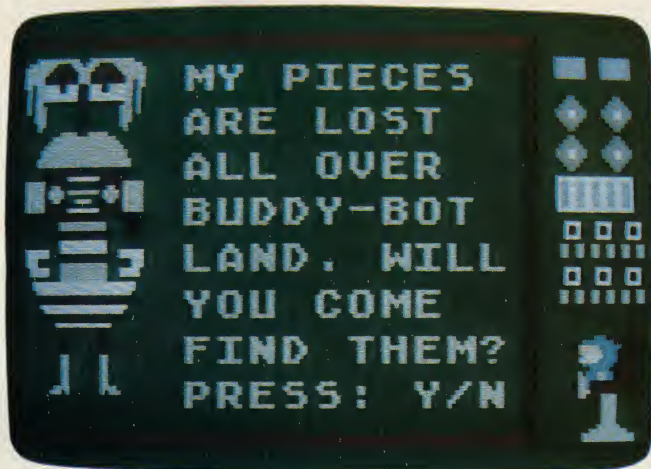
My children weren't the only ones who loved these books. So did their parents. The characters, the stories, and the pictures charmed all of us. So we read the books over and over again—as much for our entertainment as for our children's.

Programs With Personality

The most important ingredient missing from most early-learning software now on the market is *personality*. There are no interesting characters for children and parents to *care about*. The world in which the software action takes place is usually so artificial and sketchy that we have no desire to go back to it. And the story line is usually nonexistent.

This is why when I saw an announcement for a new line of software by Mercer Mayer, one of my family's favorite authors, I got very excited. Perhaps Mayer's programs would have strong characters, stories, and personality, just like his books.

On the other hand, I was worried that the programs might be as shallow as the other "celebrity" programs I had seen. Celebrities in sports, the movies, books, and records have been making software for the last year and a half, lending their famous names to rather mediocre programs. I was afraid Mercer Mayer's software might not be as wonderful as his books.



Tonk And The Buddy-Bots

Mercer Mayer's first program, *Tonk in the Land of the Buddy-Bots* (\$39.95 for the Commodore 64), is part of a future line of eight Sprout programs for children ages 4 to 12. Mayer's software development company, Angelsoft, is publishing the programs through Mindscape. For more information contact:

Mindscape, Inc.
3444 Dundee Road
Northbrook, IL 60062
(312) 480-7667

Solid Packaging

When I got *Tonk in the Land of the Buddy-Bots* in the mail, the first thing I noticed was the unusually nice packaging.

The program materials come inside a red hard-plastic case the size of a trade paperback book. Like a paperback, the case has a spine label so the software can be placed on a bookshelf—in a bookstore, a library, or home—along with other children's materials.

On the front side of the case is a nice cartoon featuring Tonk, with some of his Buddy-Bot friends in the background. Tonk and the Buddy-Bots are honestly portrayed on the cover and elsewhere in block-graphics form, instead of as smoothly drawn cartoon characters. This representation does not detract from their charm or humor.

On the back of the case are two screen photos of the program and lots of information about the contents of the package (handbook, warranty, disk), the machine requirements to make the software work (Commodore 64, disk drive, color monitor or TV, joystick optional), the age group the software is targeted for (ages 4 to 8), and the educational benefits. (Among other things the programs help children improve their concentration, their memory, and their visual discrimination skills.)

A Journey Inside The Computer

The manual to *Tonk in the Land of the Buddy-Bots* is excellent. It is short, clear, and full of cartoons and screen photos. And it begins by leaping right into the story:

Meet the TinkTonks!

Imagine that you have become a beam of light and are magically swept along inside your computer. Below you is a deep blue sea crisscrossed by a glowing grid. Above you is a peach-colored sky. On the Horizon, little disk-shaped islands float in the air above the CrissCross Sea. You fly down for a closer look. On the islands are mountains and valleys, lakes and rivers, forests and fields. One island even has a little town with houses and streets. You have found TinkTonk Land, the home of the TinkTonks.

The reader is introduced to the TinkTonks, including their trusty leader Tink; Zoomer, the speediest TinkTonk; Boomer, the biggest TinkTonk; Teep and Beep, the little twin TinkTonks; and Tinka, the best Tonkerball player in the land. In addition, the reader meets Tonk, who is Tink's best friend, and the TinkTonk who usually gets in the most trouble.

When the program begins, the first thing we see is Tonk and four Buddy-Bots on the screen dancing. The Buddy-Bots are hilarious. There is a dancing creature with rotating eyeballs, a wheeled "bot" with crossed eyes and shimmy arms, and a jogging creature with bug eyes.

The music makes the dancing, gyrating creatures seem part of a musical play. The creatures, Tonk, and the music whet your appetite for more story and more adventure.

The next thing you see is a simple menu. If you press 1, you go directly into an adventure. If you press 2, you get to play Buddy-Bot games.

My advice is to go on the adventure. The games are good, but the charm of this program is in having your child play the part of Tonk and helping out the Buddy-Bots. The games are much more effective when they are played as challenges faced during the course of the adventure.

Find The Buddy-Bot Parts

When you and your children choose "Adventure" on the menu, Tonk and a Buddy-Bot appear on the screen along with this message:

"Emergency! Emergency! Trouble in Buddy-Bot Land! A Buddy-Bot's parts are scattered everywhere. The Buddy-Bot needs Tonk to collect his parts and put him back together again."

If the child presses Y at this point, he'll look for scattered parts of the Buddy-Bot shown on



the screen. If the child presses N, he gets to choose from 128 different Buddy-Bots.

A moment later the child sees Tonk leave his treehouse, climb into a little flying saucer, and fly to the land of the Buddy-Bots. Then the computer transfers control to the child. From now until the end of the adventure, the child controls Tonk and guides him on his quest for the missing Buddy-Bot parts.

The child uses the joystick or the keys I, J, K, and M to move Tonk around Buddy-Bot Land. The land is divided into 65 screens (pictured together in a map on pages 12 and 13 of the handbook).

The child has many different options as he explores Buddy-Bot Land. If he is tired of his adventure, he can press the RUN/STOP key to stop an adventure or the F1 key to go back to the main menu. He can call up a HELP screen to review the rules. He can press the B key, and the computer will show him the Buddy-Bot parts he has found and what they look like when they are assembled into a complete Buddy-Bot.

Watch Out For The Great Gork!

No story is complete without danger and villains. The stories that appeal most to small children are miniature morality plays pitting the forces of evil against the forces of good.

In a computer game the "good guys" should be under a child's direct control. In Mercer Mayer's first adventure, there is only one good guy—Tonk. But there are plenty of bad guys and dangers, including the Great Gork, Gork's Soldiers, Black Holes, and Sky Holes.

If the child bumps into Gork, he is sent away from Buddy-Bot Land. If the child meets the soldiers, they will steal one of his Buddy-Bot parts and capture him and send him to Gork's castle.

If a child falls through a Black Hole, he lands inside Gork's castle. If he falls into a Sky

Hole, he is carried back to his treehouse. He loses all his Buddy-Bot parts and must start the adventure all over again.

Buddy-Bot Land is complex enough to be interesting, varied, and challenging. Along with the pitfalls and villains, there are cable cars and rafts to ride, there is a river to ford, a Buddy-Bot factory to visit, and caves to enter.

Educational Games

There are two ways for Tonk to collect Buddy-Bot parts. He can search Buddy-Bot Land for parts, or he can enter the caves and play a game. A child can go on the adventure or play the individual games at any of four levels of difficulty.

The games are standard educational games you see in computer programs for young children, but they are enhanced significantly by being embedded in the adventure. A child can play them with the story and Tonk's quest for Buddy-Bot parts as a backdrop that galvanizes his imagination and engages his emotions. He isn't just matching shapes in the games, he is trying to rescue a Buddy-Bot. This provides a strong incentive to concentrate, learn, and do well.

There are six games:

1. *Different/Alike*—The child has to pick the minibot (Buddy-Bot) on the screen that is different from the rest. As in all the games, there are four levels of difficulty. At the highest level, the child has to pick out the two minibots that are *exactly* alike.
2. *Match the Shadow*—The child moves a large cross-shaped cursor around on the screen until it falls on the shadow of the minibot pictured on the lefthand side of the screen. There are six minibot shadows to choose from in the easiest level, and ten shadows in the hardest level.
3. *Minibot Shuffle*—This is my favorite. It resembles the old "shell" game in which someone hides a pea inside a walnut shell, then shuffles the shells around on a table trying to confuse you so you don't know which shell hides the pea. In Minibot Shuffle, the shell is replaced by a colored box, and the pea is replaced by a minibot. The speed of the shuffling minibot boxes increases along with the level of difficulty. This is a challenging, fun, and different kind of computer game. And it is an excellent device for strengthening a child's sequencing ability, eye-tracking ability, and understanding of spatial relationships.
4. *Remember Me*—This is another nice game. First the child sees a minibot on the screen. Then the minibot disappears, and the child



has to reassemble it from an assortment of body parts. The task is divided into three steps related to parts of the body. The child has four heads to choose from, then four trunks, followed by four sets of legs and feet. At the highest level, a child has only two seconds to look at the assembled minibot at the beginning of the game before it disappears.

5. Buddy-Bot Puzzle—This time the pieces of the Buddy-Bot and the entire, assembled Buddy-Bot are on the screen at the same time. On the right side of the screen is a puzzle box where the child assembles the Buddy-Bot. A flashing cursor points to one of 12 sections inside the box that corresponds to one of 12 puzzle pieces on the center of the screen. At the highest level, the cursor jumps randomly around the puzzle box, the Buddy-Bot parts are randomly arranged (from A to L), and when a child makes a choice, he cannot change his mind.

6. Minibot Factory—After the other challenging games, this game is a relief. It's just for fun. The child pilots Tonk inside a Minibot Factory and watches minibot parts roll by across the top of the screen on a conveyor belt. A large, hollow, block-shaped cursor frames the parts momentarily as they roll by. The child selects a part when he presses the space bar. The fun of this game is to make silly Buddy-Bots—with heads underneath legs underneath bodies; or with three heads, or three bodies, or three sets of legs. Once the child has built the minibot, the computer animates it, and the jaws open and close, the eyes rotate, the arms wave, and the legs jump up and down.

What Eric Thought

After I previewed *Tonk in the Land of the Buddy-*

Bots, I found my five-year-old son Eric, and we played together.

Eric liked the adventure and the games as much as I did. Together we had only one serious criticism: the way right and wrong answers were handled.

For example, in playing *Same or Different*, when Eric picked the wrong minibot, the computer responded with: **YOU'RE WRONG!**

This answer was a real shocker. Most early-learning software developers these days adhere to the philosophy that software for little children should not be judgmental, or that, at least, the judgments should be gentle. This is not gentle. Eric and I thought that software that yells at us (with exclamation points) is very unfriendly and not very nice.

We also had other problems with the messages. For example, they were not accompanied by any sound. This seemed to be a great oversight—both in terms of entertainment and educational value. The Commodore 64 has such good sound (used so well in other parts of the program) that it's a shame when it's missing. The contrast with the other parts of the game in which sound accompanies the action was very noticeable and unpleasant.

Finally, after Eric and I got zero out of six answers correct on one game, the Great Gork appeared on the screen to tell us that we didn't get all the answers right, and to try again. Later, after we got four out of five answers correct on another game, Gork reappeared with the same message.

I found this a great let-down. When we got all the answers wrong, we thought Gork was being nice to us, but when we got almost all the answers correct, we were proud of our efforts. We expected Gork to come on the screen and congratulate us. Instead he told us we weren't perfect ("You did not get all answers right."), and he ignored our achievement.

Later, when we were playing the *Remember Me* game, we had a similar experience. We remembered two out of three of the minibot parts, but the minibot still told us, "You forgot me!" I would have preferred to have had the minibot congratulate us for remembering two out of three parts, and then call our attention to the part we missed.

Encore!

These are serious grievances, but they are still minor compared to the pleasure Eric and I had playing with the programs.

The games are innovative, and Tonk and the minibots are delightful. There are lots of nice little touches, too, which show careful design.



For example, when Tonk bumps into a wall, he falls back, gently, on his bottom.

Mercer Mayer's first "software fairy tales" are not as good as his books, but they are still superior to most of the programs now on the market for young children.

Eric and I hope that in future programs the computer's responses to our answers will be improved, and we hope to go on new adventures with Tonk and the other TinkTonks really soon.

Run, Tonk, Run!

Tonk in the Land of the Buddy-Bots allows your child to play using the I, J, K, and M keys on the keyboard or using a joystick.

Your natural tendency might be to have your child abandon the complicated keyboard in favor of the joystick. But you might want to reconsider.

First, joysticks are notoriously hard for small children to control. They are stiff and hard for little children to move. They are awkward for little children to hold in their small hands or in their laps. And young children frequently get the joystick turned upside down so that the joystick action is reversed from what the child expects (left is right and up is down). All in all, this adds up to a very frustrating experience for a small child.

Second, keyboards are not as frightening to small children as they are to adults. Also, children find that once they learn the direction keys on a program, they have more control over the motion of the computer character on the screen than they do with a joystick.

Teachers and parents can help small children recognize the I, J, K, and M keys on the keyboard by putting small colored dot stickers on each of the keys. For example, a red dot could go on I, a blue dot on M, a yellow dot on J, and a green dot on K. This helps children associate the dots

with the letters and the respective directions.

If you plan to use a joystick anyway, you might consider one of the new Wico joysticks. After experimenting with several joysticks, my son Eric and I have decided that the Wico sticks are the easiest to control.

Wico Analog Joysticks have the softest touch and are the best for small children. Another good Wico joystick for the Commodore 64 is the Wico Command Control. You can learn more about these joysticks and others by going to your dealer or by contacting: Wico Corporation, Consumer Division, 6400 West Gross Point Road, Niles, IL 60648, (800-323-4014). ☐

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A Look At New Books From "Reggie" D'Ignazio

Fred D'Ignazio, Associate Editor

A Peek In The Mirror

I'm a magazine columnist. That means that every month I get the opportunity to climb up a mountain, grab a bullhorn, and harangue thousands of GAZETTE readers.

Some months I take a look at new products that have caught my fancy. Other months I tell you about all the foolishness that goes on around my house, with our kids and computers. And some months I get philosophical, and spin off ideas and opinions I hope will stimulate and provoke you.

Until a couple weeks ago, when I got up and made my speech to you each month I never thought about how I must look to you. Then I got a letter from Dallas Denny of Nashville, Tennessee. Dallas enclosed the June 1984 issue of the *Nashville Commodore Users Group (NCUG) Magazine*. On page 5 was a piece by Dallas entitled, "On the Road with Reggie D'Ignazio." The title of the piece comes from my column in *COMPUTE!* magazine entitled, "On the Road with Fred D'Ignazio." And the piece parodies my columns in various *COMPUTE!* publications. I'd like to share it with you here:

On the Road with Reggie D'Ignazio

There is a place in my house where you or I can go zooming into the sky like a jet fighter pilot with a fine mustache, or feed peanuts to the elephants at the zoo, or figure out our budget for Christmas presents for Aunt Patsy and Uncle Roger, or play tic-tac-toe with someone who lives in a cloud. It is a magical, exciting place. It does not have fancy curtains or decorations, or even a rug on the floor, but in it my neighbor's children have killed nasty green aliens from space, and in it they have made friends with men in red-and-white-striped balloons. It is a place where there is a

television screen, but where television never comes. It is a place which is filled with wonderful sights and sounds.

The place that I am talking about has a lot of outlets to plug things into. You can plug things into slots in the floor or the wall, or dangle them from the lightbulbs on the ceilings. It has a desk with lots of interesting things: there are pencils without erasers and pens without caps, staples, rulers, ink, paper clips, rubber bands, razor blades, harmonicas, matchbooks from faraway places, batteries, note pads, stamps, out-of-date prescriptions, envelopes, guitar picks, pocketknives, screws, rolls of tape, and expired identification cards.

On the desk in my place sits a computer. It is not a particularly big computer, or a particularly tiny computer; it is just a computer. But my computer is a ticket on Lufthansa Airlines. It is a letter from my grandmother. It is a vacation trip to Disneyland. My computer is a lifetime subscription to National Geographic Magazine. It is a paper cup telephone that connects me with my friends. It is a notebook on which I can scribble my thoughts. It is dinner for two at Andre's. It is a reunion with an old friend, it is a coloring book, it is a safari to Africa.

There are places with computers like mine all over America, all over the world. Magic places. And ... who knows? Maybe there are similar places on Betelgeuse, Sirius, or Proxima Centauri. If there are, do you think we could arrange a software exchange?

When I read Reggie's "column," I laughed and winced—at the same time. Do I really sound like Reggie to you readers out there?

I would welcome hearing more from Reggie and from any other "Fred D'Ignazio" clones and lookalikes that you can invent. In the future, I

plan to publish the best "columns" I receive. Then I'll ask you if you can tell the difference between the real Fred D'Ignazio and his artful imposters. I have the embarrassing suspicion that separating Freddie and Reggie D'Ignazio will not be that easy.

A Potpourri Of Books

Every month I receive dozens of books about computers, robots, and high technology. I read through the ones that look like they would interest me. I'd like to share the best of these with you.

I've grouped the books by topic. First, *introductory books*. There are thousands of these on the market. One of the most current and most readable is George Beekman's *The Commodore 64 Home Companion* (Datamost, 1984, \$19.95, 359 pages, index, appendices).

Unlike many so-called "beginner's" manuals, Beekman's book is truly accessible, attractive, and *inviting*—for the entire family. It's a great alternative to a user's manual. It should appeal to both the young and old non-technical members of the family.

Also, the book is comprehensive. It begins by introducing you to the applications home computers can perform. Then it takes you, step by step, into buying software and hardware, setting up a system on your own, programming, and dealing with peripherals like modems and printers. The book ends up with a solid index, a list of user groups, and a handy pull-out summary card with BASIC commands, how to LOAD and RUN a program, how to SAVE a program, how to view the disk directory, how to format a disk, how to control the screen, and how to use a modem.

The second introductory book I'd like to recommend is *Computer FUNdamentals*, by Barbara Kurshan and Nancy Healy (Reston, 1984, \$16.95, 208 pages oversized).

Computer FUNdamentals is a big activity book, equally suitable for families and schools. Each chapter begins with a brief look at such topics as computer history, programming, and computer applications. Most of each chapter, however, consists of activities, and *many of the activities don't require a computer*. For example, you can assemble your own computer out of an egg carton and write programs for it. Or you can create a junk robot out of shoe boxes, bits of tin foil, and markers. There are dozens of activities. All are attractive and easy to do, and they all teach some aspect of using computers. At the end of the book is a "keys and answers" section that gives the solutions to computer problems in the book.

Computer FUNdamentals makes an excellent

introduction to the broader, more practical aspects of "computer literacy" for children ages 8 to 13.

As a companion to *FUNdamentals*, I would recommend *The Beginner's Computer Dictionary* by Elizabeth S. Wall and Alexander C. Wall (Avon/Camelot, 1984, \$2.25, 80 pages, paperback). This is a straightforward reference book and complete guide to computer terms for children grades 4 and up.

For younger children, I'd recommend *The Computer Alphabet Book* by Elizabeth S. Wall (Avon/Camelot, 1984, \$2.25, unpagged).

This is a sprightly little book designed to be used by beginning readers in 1st, 2nd, and 3rd grade, and to be read by parents to younger children. When you browse through the book, you see that on the left side you have a big letter of the alphabet, followed by a computer term and a brief explanation. On the right side (on the facing page) is a cartoon of a silly, Snoopy-like dog learning about computers.

This book has a laudable, secondary purpose. As parents read it to their children, they may also be acquiring a painless dose of computer literacy themselves, including information about the computer's memory, programming languages, computer parts, computer applications, and fundamentals about how people actually use computers. If you find other computer manuals too scary and technical, then this is the book for you.

A companion package to Wall's *Alphabet Book*, or a possible alternative, is a book/software package, *Qwerty's Alphabet Adventure* by Shadow Lawn Press (Hayden, 1984, \$19.95, 4-color unpagged book, Commodore 64 diskette).

Qwerty is a cute little caterpillar who takes your child on a journey through the letters of the alphabet. The pictures on the computer screen are extremely simple, but the Qwerty character and the illustrations in the Qwerty book compare favorably with other alphabet books for children.

I like Elizabeth Wall's *Alphabet Book* and *Qwerty's Adventure* because picturebooks, stories, and cartoon characters are a familiar and comfortable way for young children and their parents to begin learning about computers. In addition, the Qwerty package combines storytelling and books with a hands-on introduction to the computer keyboard.

Puzzles And Adventures

Computers can act like workhorses and number crunchers, but they can also stimulate our imagination, and help strengthen our thinking skills. I welcome any books and programs that open up this dimension of computers to new users—especially children.

The Commodore Puzzle Book: BASIC Brain-teasers by Gordon Lee and Nevin B. Scrimshaw (Birkhauser, 1983, \$7.95, 125 pages, paperback) and *At the Heart of the Mountain: A BASIC Adventure for the Commodore 64* (Birkhauser, 1984, \$9.95, 170 pages) are two good books that emphasize using the computer to strengthen your thinking skills and your imagination.

The *Puzzle Book* is filled with 50 brainteasers and their answers (at the back of the book). The book gives various programming solutions to the puzzles and emphasizes that there are many different ways to write a program that solves a problem.

In *Heart of the Mountain*, you spend an adventurous summer with Erin in the White Mountains of New Hampshire and learn about the Commodore 64 along the way.

Heart and the *Puzzle Book* are for children ages 10 and up. If your children are younger, you might look into the *Micro Adventure Series* from Scholastic. The first book in the series, *Space Attack* by Eileen Buckholtz and Ruth Glick (Scholastic, 1984, \$1.95, 123 pages) lets your children use their computer to decode alien messages and become a member of ACT (the Action Computer Team). On the way they enter, use, and modify eight computer programs written in BASIC.

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In another book, *BASIC FUN with Adventure Games* by Susan Drake Lipscomb and Margaret Ann Zuanich (Avon/ Camelot, 1984, \$2.95, 96 pages), children get to go on a spy mission using their computer. Then they get to devise an adventure game of their own. The book teaches them how to construct a plot, define the solution, and determine all the obstacles and hazards that the gameplayer must face. Then it shows them how to translate their ideas into a BASIC program.

For older members of the family—teens and adults—you might want to look at *The Book of Adventure Games* by Kim Schuette (The Arrays, Inc., 1984, \$19.95, 341 pages oversized). This book is a bargain if you and your family spend your computer time wandering through mazes, dungeons, and caves in adventure games. It's a reference book full of evaluations, maps, illustrations, and clues for over 75 of the most popular games. The book takes the frustration—not the challenge—out of computer adventure games.

Armchair Computer Literacy

As we all know, computer literacy is more than learning about bits and bytes. To become truly literate about computers we need to be able to step back and look at them from a distance and try to assess the impact they are having on our world.

Three books that attempt to do this take very different vantage points and, hence, complement each other nicely.

Patricia Marks Greenfield, in *Mind and Media* (Harvard University Press, 1984, \$4.95, 210 pages, index, paperback) tries to assess the effects of television, video games, and computers on children. Anxious parents and teachers, concerned with their children's social and intellectual development, will find lots of fresh ideas in this book.

Glenn M. Kleiman, in *Brave New Schools* (Reston, 1984, \$14.95, 207 pages, index, paperback) takes a close look at the computer in the classroom and at the many ways it can be used as a valuable learning tool. If you are wondering what your kids are doing with computers in school—or what they *ought* to be doing—you should read Kleiman's book.

Last, Sherry Turkle, in *The Second Self: Computers and the Human Spirit* (Simon & Schuster, 1984, \$17.95, 362 pages, index, hard-cover), looks at the way computers affect the way we think—especially the way we think about ourselves. Turkle spent four years investigating the influence computers have on the psychology and development of preschoolers, elementary-age children, and teenagers. According to Turkle, the question is not what will the computer be like in the future, but what will *we* be like?

COMPUTING for families

An Adventure In Telecommunications

Fred D'Ignazio, Associate Editor

A Computer Ostrich

I use computers for word processing, games, and education, but until recently I never used them for telecommunications. I was like an ostrich—keeping my head firmly in the sand.

Every now and then I would read a computer magazine article about telecommunications. But when I lifted my head out of the ground, I felt like an infantryman caught in a cross-fire. Telecommunication terms like *baud rate*, *parity*, *asynchronous communication*, *word length*, *stop bits*, and *xmodem protocol* whizzed over my head like angry bullets. Needless to say, I immediately stuck my head back into the hole in the ground. I figured it was safer there.

Then one day last summer I attended the CES (Consumer Electronics Show) in Chicago. I was walking by the Prentice-Hall Software booth and ran into Ken Skier. I remembered Ken as the author of *SkiWriter*, a word processing package for the Epson HX-20, the tiny lap-sized computer with only a few thousand bytes of total memory. Now Ken was all fired up about a new word processing program he had written for the Commodore 64 called *SkiWriter II*.

This new word processor comes on a 16K memory cartridge that plugs into the back of the 64, and costs \$69.95. You can learn more about *SkiWriter II* by contacting:

Prentice-Hall Home Software
P.O. Box 819
Englewood Cliffs, NJ 07632
(201) 592-2611

To Ken, 16K is a lot of memory, and he had no trouble at all fitting a powerful word processing program into the cartridge.

But that's not all he put into the cartridge. He had so much space left after he wrote the word processor that he decided to add a telecommunications program, too. So *SkiWriter II* for

the 64 is not just a word processor, it's a *communicating* word processor.

There is a precedent for this idea on the little, notebook-sized computers like the Model 100 from Radio Shack and the NEC 8201. These little computers have a telecommunications program and a word processor built into the circuits when you bring them home from the store. The programs are separate (unlike the *Skiwriter II*), but they are so easy to use, it's like they're really the same program.

When Ken showed me *SkiWriter II* at CES, he asked me to sit down and try it out. I hate trying new programs out in front of other people, because I always end up doing foolish things. Despite my reservations, I sat down at the computer and began typing.

One-Touch Functions

The first thing I noticed was the plastic overlay that fit around the 64 keyboard. There were 21 functions assigned to special keys on the keyboard, but the functions were all simple like FIND, REPLACE, TOP, BOTTOM, CANCEL, and EXECUTE, and they were written in big, bold letters. This didn't look too hard. Maybe I wouldn't look like a fool after all.

Next we plugged in the cartridge and turned on the computer. On the screen a menu appeared with an arrow pointing to the top item:

→ Edit
Preview
Print
Use Cassette
Use Disk
Use Modem
Select Colors
Delete the Document

I pressed the arrow keys on the 64 and made the menu (not the arrow) move up and

down, slowly at first, then fast like a bouncing ball. I could have sat there another couple minutes just watching the menu bounce up and down, but I could tell that, behind me, Ken was getting a little bored.

I stopped the bouncing menu at Edit and pressed the EXECUTE button. The screen emptied, and I was ready to begin creating a document.

I created a document easily by letting my fingers go wild. I filled the screen with gobbledygook characters.

"This is neat," I told Ken, "but I can't read the white characters on the blue background very well."

"No problem," Ken said. He showed me how to bail out of Edit (by pressing the CANCEL button) and how to select new text and background colors. I chose black letters on a white background, because it gave me the pleasant illusion that I was using paper and a typewriter rather than a computer and a video screen.

Next, we backed our way into Edit again. I noticed that the computer had remembered the trail we had followed out of Edit, so all I had to do was hit the CANCEL key a couple times. I felt like Hansel or Gretel following bread crumbs through the forest. The computer had remembered my pathway so I couldn't wander off into the forest of unexplored commands.

When we returned to Edit, Ken showed me how to press the different function buttons (all clearly marked with the plastic overlay). We moved blocks of text around, we copied blocks of text, we underlined words—yes, *underlined words right on the screen!*—and we replaced typos with some genuine English, and deleted huge clumps of especially hopeless gobbledygook.

After only about ten minutes of fiddling around with the text, I was zipping around, correcting errors, inserting new sentences and words, and making corrections. After only 15 minutes the whole document was completely spruced up and (to my eyes) error free.

I did have some problems, though. First, as I typed, the overlay tended to move around a little underneath the palms of my hands. This was distracting at first, but I soon got used to it. It didn't slow my typing.

Second, I missed having any commands that would allow me to jump from one end of the line to another, or jump from the beginning of one word to the next, so I could move the cursor even faster along a particular line.

Third, it took me awhile to remember to use the EXECUTE key (f3) instead of the RETURN key to choose items in the *SkiWriter II* menu. (You use the RETURN key, however, when you

are typing your document.)

Fourth, it was hard getting used to using the backspace key as the DELETE LEFT key on the upper lefthand corner of the keyboard instead of its normal place on the upper righthand corner.

However, there were numerous appealing things I found while using the word processor, too. First, the DELETE LEFT key on the left allowed Ken to use the DEL key on the right to let me delete text to the RIGHT (beginning with the cursor). This way, when I wanted to correct a word, I could move in either direction, no matter where I ended up on the word.

This is a great feature for those of us who are somewhat klutzy with their fingers. In my haste to zip around a document in my tiny cursor "airplane," sometimes I come in for a landing on a word and almost miss it. It's great to begin deleting to the right or the left depending on where I have haphazardly landed.

Also, the RETURN character has special status in the word processor and can be edited, so you can use the FIND command and find the RETURN character and replace it or add extra spaces, or whatever. This can be a great help when you need to reformat a document.

And there are lots of nice touches. When you insert text, even at the beginning of a large document, *the whole document* instantly moves down to make room. The paragraph and the whole document automatically and swiftly reformat. There is no wait whatsoever.

Also, the word-wrap happens instantaneously, so you can go typing along and never worry about fitting things on the screen.

And when you want to print your document, you don't have to remember all sorts of esoteric commands to double or triple space the lines, or add headers, or increase the size of your margins. Instead, you just press the EDIT key and the DOT LINE key and step through a menu. As you make your choices, the computer automatically inserts dot formatting commands into the text of your document.

Later on, when you become a more seasoned user, you can bypass this phase by typing the dot commands into your document yourself *in English*. For example, you can type:

.SPACES = 1

to single-space the document. And when this gets to be too tedious, you can abbreviate the command to **.S=1**.

Once you are done editing your document, you simply press the CANCEL key to get out of Edit and bounce the menu around until you get to PRINT. And, if you have a printer connected, you just press the PRINT key a second time and your document prints out.

Saving The Best For Last

SkiWriter II is a fine word processor, but its best feature is how easy it makes using the telephone with your computer.

After I finished typing my document and saving it on disk (with just a couple extra keystrokes—*SkiWriter II* even enables you to format the disk within the program), Ken and I plugged a Commodore Automodem into the 64's user port.

According to Ken, almost any modem that plugs directly into the user port will work, including the Automodem and VICmodem from Commodore and the HesModem from HesWare. Also, acoustic couplers (such as the Lex-11 and Lex-11B from Lexicon) can be plugged into the back of the 64 if they have an RS-232C interface (such as the MFJ-1228 from MFJ in Alabama).

We set the AutoModem's switches to Data (instead of Talk), Originate (to "originate" a phone call), and Full Duplex (the standard setting for micros to talk to each other or to big computers).

Then I pressed the CANCEL key and got the main menu. I bounced the menu to USE MODEM. I selected AutoModem and DIAL, and the computer asked me which number to dial. I typed in a number Ken gave me, and the computer dialed an IBM PCjr right next to me in the booth. The PCjr was running its own version of *SkiWriter*. The PCjr answered the telephone, and waited for me to begin typing.

Ken had me enter the *conversation* mode in *SkiWriter*. This is the mode you use when two computers running *SkiWriter* are talking to each other.

Ken sat down at the PCjr and typed me a message. As he typed it, I saw it appear, letter by letter, and word by word, on my 64. I could hardly believe it. A PCjr was talking to a 64 as easily and casually as if this sort of thing happened every day. And we were talking over the phone line. We were only a couple of feet apart, but we could have been a couple thousand miles apart.

After we sent messages for a few minutes, Ken pressed the f7 key and the words CAPTURE ON appeared on the screen of his PCjr. He had me press the CANCEL key and bounce the menu to upload (transmit) a document. As soon as I did this, my document began zipping across the phone line and appeared on Ken's screen. At the same time it was being stored in the memory of Ken's computer. We watched the numbers whiz by on the screen, showing the memory being used up by the document as it rushed into the computer.

When the document was completely transmitted to Ken's computer, he loaded a document

from his disk and we reversed the process. He selected UPLOAD, and this time I typed DOWNLOAD on my 64, and a moment later the cursor raced across the screen indicating that the document was being transmitted and stored in my computer.

After we were done sending each other documents, I pressed CANCEL, pressed USE AUTOMODEM, and chose HANG UP. My computer hung up the telephone. Ken issued the same commands, and his computer hung up at the other end.

Then I chose Edit on the menu and there was my old document. Underneath, neatly appended to it, was the document I had just received from Ken's computer. Now I could edit the document, change it, delete it, copy it, save it to disk, print it, or send it along the phone wire to some new computer and to another person.

An Ingenious Marriage

After visiting Ken's booth at CES, I was bitten by the telecommunications bug. I returned home to Virginia, and immediately started teaching my 23 computers how to talk on the telephone.

This was no easy task. The truth is, many computers would rather remain isolationist and *never* talk to another computer—or to another person.

But I persisted, and today most of them can talk over the phone. We even have two phone lines so they can talk to each other.

I have tried out many different communications programs since playing with *SkiWriter II*, but I haven't found another communicating word processor. It is convenient to be able to create a document, and in the same breath, send it via electronic mail across the country to a friend, a member of the family, or to a publisher.

Simplicity, convenience, and ease of use are important features for any program that lets you create and send information electronically. Most electronic mail services (like the Source, CompuServe, or MCI Mail) are somewhat picky.

They like documents to be in pure text, or ASCII, format. This is the type of format *SkiWriterII* documents appear in. You don't have to fiddle around with a document after you type it up, you just send it.

And receiving documents is just as simple. You just point to DOWNLOAD or set CAPTURE ON and wait while the document is loaded into your computer. Then you can display the document you're receiving on the screen, and you can go into EDIT, spruce it up, and make it pretty. Then you can print it out or save it to disk. You don't have to fool around with complicated commands or telecommunications jargon.

COMPUTING for families

Computer Thrillers In Search Of A "Software" Michael Jackson

Fred D'Ignazio, Associate Editor

In my new COMPUTE! book, *Computing Together: A Parent's and Teacher's Guide to Computing with Young Children*, I introduce the concept of a computer "friend." The friend is a replacement for the average computer's dreary, unfriendly operating system (the part of the computer that helps you copy, save, and create files).

The computer friend is similar to the new Apple Macintosh's operating system. The Macintosh operating system pretends that it is an electronic desktop. On the screen are several familiar items you might see on or near a desktop, including pieces of paper, file folders, and a trash can. The Macintosh lets you perform computer operations by manipulating these familiar items by pushing a mouse around on the table. (The mouse is a cigarette-case-sized box with a "mouse tail" cord connecting it to the computer.)

The Macintosh operating system imitates a desktop. My friend operating system imitates a person. When the child turns on the computer and loads the disk, the friend's face appears automatically on the screen. At first, the friend's eyes are closed—the friend is asleep. But a bell rings and the friend wakes up and grins. "Who turned me on?" the friend asks.

The Macintosh has a *Finder* program that goes off and "finds" files for the person. The friend acts as a finder, too. The friend asks the child if he or she wants to play a game. If so, the friend presents the child with a list of games to play (a "file catalog"). Then the child gets to select his or her favorite game. The friend accepts the child's choice, goes off and finds the game and starts it running.

When the child is finished playing the game, the game automatically returns control of the computer to the friend. The friend asks the child if he or she wants to play another game. Or (with some additional commands) the friend might have a conversation with the child and talk about things that are important to the child.

A Computer With Personality

A computer friend program should not be dull. It should be loaded with personality. The friend's personality might stem from the personality of the designer. In the future we might see "designer friends"—like designer jeans. The personality of the friend would reflect the taste and interests of the friend's creator, the software design team.

We might see computer friends whose

personality mimicked the personality of a famous movie star or cartoon hero. A family might be able to buy a Mickey Mouse computer friend, a Kermit the Frog friend, a Cat in the Hat friend, or even a Barbie-doll or G.I. Joe friend.

Or, akin to Spinnaker's *Facemaker* program and Designware's *Creature Creator* program, we might see friends that children could create themselves. There might even be a "Build-A-Friend" kit the family could use to install the friend's operating system on their computer.

A Program With Character

Of course, computer friends don't just have to reside in the computer's operating system. They can also come inside games and other programs that children run on the computer.

The key is that the character in the program must be so charming, so energetic and alive that it leaps off the screen!

How many programs have you seen with characters that do that?

In many computer programs (word processors, filing programs, and many games), there are no characters at all. All the action takes place in an artificial environment uninhabited by creatures of any kind, simulated or otherwise.

Many other computer programs contain characters, but they are so small, so narrowly defined, so one-dimensional that they are nothing that a child could warm up to. Most video games fit into this category.

There is a third class of programs that feature characters taken from personalities popular in other media. This is a type of "celebrity software." Unfortunately, in most cases the stars from film, TV, and children's picturebooks do not make a graceful transition to the computer screen. The visual appeal of the characters is substantially reduced, and the characters are relatively lifeless compared to their picturebook or cartoon counterparts. A child can move these dull, blockish characters around on the computer screen (with a touchpad, cursor key, or joystick), but what is the point? The experience, for the child, can hardly compare with the experience of a parent reading a good picturebook or watching a good film or animation.

Software clones of popular stars in other media are sure to be popular, but only because children (and adults) have a great hunger to interact with other lifelike creatures, as opposed to sterile, lifeless icons, spreadsheets, numbers, words, or geometric shapes.

What we really need is a talent hunt for fresh, new stars to grace the computer stage. We need software superstars that are as fascinating and lovable as Michael Jackson and E.T.

Stars Of The Computer Stage

We are seeing the first halting steps toward software characters with star quality. For example, there are the storybook programs, like *Robin's Halloween* and *Sammy the Sea Serpent*, from PDI, on Atari computers. There is *Gertrude the Goose*, who stars in *Gertrude's Puzzles* and *Gertrude's Secrets*, from The Learning Company. And there is a plump, silly dinosaur, *Bagasaurus* (or "Baggy"), from the *Learning with Language* package developed by the Children's Television Workshop for the Radio Shack Color Computer.

Here Comes Alf!

And then there's Alf.

Alf is the hero in a new computer game, *Alf in the Color Caves*, from Spinnaker Software. Alf is for children ages 3 and up. The first version of the game is for the Commodore 64. The Alf cartridge costs \$39.95. For more information, contact:

Spinnaker Software Corporation
215 First Street
Cambridge, MA 02142
617/868-4700

Alf was created by Joyce Hakansson and Associates, Inc. Before setting off on her own, Hakansson worked for Children's Television Workshop and helped to create the excellent Sesame Street computer programs for the Apple II computers.

A lot of work went into Alf. Alf is a simple creature—all feet, head, and nose. But, boy, can he dance! *Time* magazine recently called Michael Jackson the Duke of Dance. Jackson has probably never heard of Alf. But Jackson had better watch out. Alf is a real contender. He is certainly the *electronic Duke of Dance*.

Alf bounces up and down on his giant feet, spins around, then whirls around, in break dance style, on his index finger. (I have no idea where this finger comes from. After all, Alf has no hands.)

Like Jackson, Alf doesn't just dance, he *acts*. His body is pure plastic. It vibrates, stretches, bends, and twists to the musical beat. His eyes are hilarious. Sometimes he half-closes his eyes and peeps out at you. Then he looks sneaky and mischievous. Other times he opens his eyes wide. Then he looks charming and innocent.

Alf is a comedian. Everything he does is funny.

The music Alf dances to is just as colorful as he is. It takes full advantage of the Commodore music (SID) chip. When you finish playing this game and walk away, you find yourself humming Alf's tune. It's like whistling the theme song from your favorite movie or favorite rock video from MTV.



Software Movies

The action in *Alf in the Color Caves* is important because it can be controlled by a toddler. Unlike most other video games, small children can master this one.

A child uses a joystick to maneuver Alf through the mazelike color caves, while avoiding the shifty-eyed wufflegump creatures. Each time the child takes Alf through the caves, more of the wufflegumps appear. If Alf bumps into a wufflegump he automatically whooshes back to the top of the caves.

It is fun just to watch Alf. But it is a real thrill to control Alf's basic direction (he bumps and swings in all directions, no matter how you push the joystick). Alf is such a neat character, it is exciting just to move him around.

In fact, the *Alf* game is like a small, animated movie—an interactive movie. And the special effects in this movie are terrific. For example, Alf has to climb through passages with lots of different shapes. When he passes through the passages, his body squishes together, his eyes cross, and you hear special sound effects. When Alf passes through a U-shaped passage, it revolves around and around like a swinging door, and you can see poor Alf inside, getting dizzier and dizzier.

The Alf Story

Alf in the Color Caves comes with an illustrated book that explains the educational aspects of the game—how it teaches children cause-and-effect relationships, navigation skills, prediction skills, and pattern recognition skills. The book also has a section full of activities you can do with Alf.

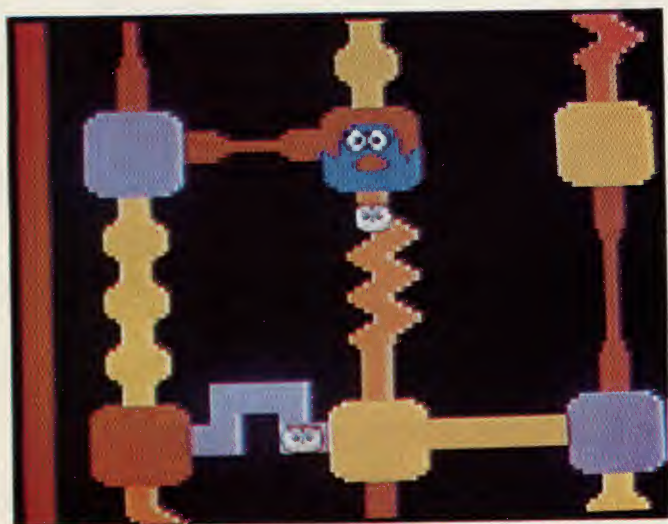
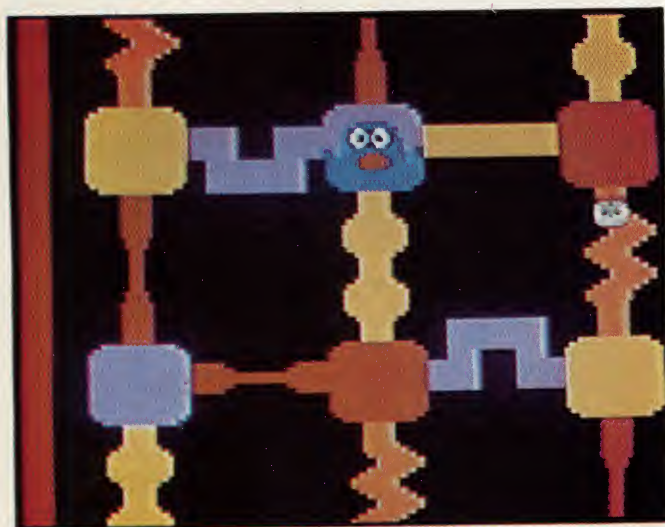
But my favorite part of the book is "The Alf Story," in which we learn, in rhyme, that the grumpy wufflegumps don't just move, they "sniggle" and "slooze."

The story book is very brief, but it further convinces you that Alf is a real character. It is like the novelization of a good movie.

Good For Adults, Too!

It would be nice if children weren't the only people who got to meet Alf. Computer-anxious adults should also get the chance. Alf is so charming he might be able to help them forget their fears about computers.

Also (this is the idea of my friend Mary Umans), since it is easy for adults to maneuver Alf through the color caves, they can concentrate on interacting with Alf himself. Alf is so easy to move around that the adult doesn't have to worry about making a fool of himself. Instead he can concentrate on Alf and his funny twisting,



bumping, and dancing.


Also, Alf gives an adult a chance to work with a computer on familiar terrain. Gone are the alien, shoot-'em-up video game worlds. Instead the adult feels like he has jumped, with both feet, inside a colorful, happy Walt Disney cartoon. This is a great place for an adult to start computing, and Alf makes a perfect companion.

Encore!

Alf is not the ultimate software superstar. But he is a good beginning.

A software character, like Alf, should be so charming that you want to keep returning to the character's world and accompany the character on new adventures. At the end of each game, when the character is done performing, you will want to cry, "Encore! Encore!"

Software characters could be very profitable for a software publisher. If the character delights the public, they will be hungry for sequels, trilogies, even sagas, all involving that same character and set in that character's world.

So, Joyce, what are your plans for Alf? He's cute enough to star in his own series. Hopefully he'll be back soon, dancing across our computer screens. 



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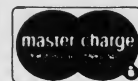
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COMPUTING for families

Computer Show And Tell

Fred D'Ignazio, Associate Editor

In a recent issue of *COMPUTE!* (October 1983), I wrote about educational computing at home and at school as isolated "islands" of computer learning. I expressed the fear that unless bridges were built between these islands, much of the computer's educational potential would never be realized.

In the article, I suggested some home-school bridges that Kenneth Komosky (Educational Director of the Educational Products Information Exchange—EPIE) and I had come up with, including:

- Community-wide training of parents, teachers, and children.
- Community-wide computer cooperatives in which computer vendors work with schools and families to disseminate information about computers and offer discounts to families (especially low-income families).
- Communication—A Parents and Teachers Computer Association could be formed. It could hold monthly meetings and publish a monthly newsletter that evaluates new computer products and educational software, and spreads the word about educational computing activities going on in homes, classrooms, and libraries in the community.
- Opportunities for Action—The community could organize computer faires, computer flea markets, and "brag nights" to show what the kids are doing with computers at home and at school.
- Sharing—The community could begin collecting old computers and software and set up a "computer library" (perhaps as a section of the public or school library). The library could keep review materials on the latest hardware and software; it could help increase the ratio of computers to kids in school; and it could make computers available for low-

income members of the community. A library could serve an especially valuable purpose by collecting information on the ways computers can help special children who are learning disabled, or physically or mentally handicapped.

Starting Simple

The program to link home and school computing is extremely ambitious. It is not something that can be implemented overnight. It is a good idea to start simple with one or two bridge-building activities, then add new activities gradually. I have found this out from personal experience.

In my hometown, Roanoke, Virginia, I am trying to put some of these ideas into practice. In the last few weeks I have learned that building computer bridges between home and school is a major undertaking. All we have set up, so far, is a swaying, rickety footbridge made up of popsicle sticks. But it's a start.

A Warm Reception

I have a five-year-old son (Eric) in a local kindergarten and an eight-year-old daughter (Catie) in third grade.

I began my bridge-building project by calling Catie's teacher, Mrs. Albertson, and volunteering to loan the school an extra computer we had sitting around the house.

I was nervous about calling Mrs. Albertson and offering her the computer. I was afraid that she might not want a computer in her class. I was worried that she would think I was an uppity parent bent on interfering with her teaching.

I was wrong.

"What a terrific idea!" Mrs. Albertson said when she heard my proposal. "We'd love to have a computer in the room. When can the computer come for a visit?"

I told Mrs. Albertson that we didn't have a TV set or monitor for the computer. She would have to scavenge one somewhere. Also, I told her that the class would need a table for the computer and a six-foot-square space in the room next to an electrical outlet. Mrs. Albertson said she'd talk to the lower-school principal and see what she could do.

The Project Grows

Two weeks later, Mrs. Albertson called and told me that she had talked with the lower-school principal, the headmaster of the whole school, and the head of student government. Everyone had gone looking for funds and had put together enough money to enable Mrs. Albertson to buy a new 20-inch color TV for the computer.

After hearing about the TV, I didn't even ask about the table, the space, and the electric outlet. I was sure that they, too, had been taken care of. When I visited the classroom a week later, I found they had.

Mrs. Albertson said that everyone at the school was excited about the project because they hoped that the computer could become a resource for the entire third grade, and, secondarily, for the whole lower school. It was to be the first computer for kindergarten through grade three.

Enlisting The Local Computer Store

I was so encouraged by the school's response that I drove over to the local computer store and proposed that they get involved, too. I showed them my "Islands Of Learning" article in *COMPUTE!*, and I asked them what they would like to contribute to our bridge-building project.

The computer store owners' response was amazing. They said they would be happy to donate two disk-based computers to the school for a trial, two-month period. They also offered a

discount on all computers purchased by parents if the school handled the purchases.

I volunteered to act as educational software consultant to the store and to tell the store owners about the most popular programs that we used over at the school. We would test the programs in school, then let the store know which ones were best.

Where Should The Computers Go?

I spent the next few nights on the phone with Mrs. Albertson and with Eric's two teachers, Mrs. Paitsell and Mrs. Carling.

I proposed that the second computer go into Eric's kindergarten class. That would make computers available in the kindergarten and third grades. The first and second graders could try out the programs that would be running on the third-grade computer. Their teachers could also take them to the kindergarten and let them try the programs for younger children that would be running on the kindergarten computer.

I liked this approach because we could experiment with using the computer at two distinct developmental levels. It would be interesting to see what programs would work best with the different age groups.

A Sneak Preview

Catie and Eric's teachers felt that I should bring a computer to the school for a visit before we permanently installed the computers in the classrooms. Mrs. Albertson had a table, a space, an electrical outlet, and a big color TV, so we used her classroom.



Harry Blair

I selected Catie and Eric's best educational programs to show off at school. I drove to the computer store and picked up a computer like the two that would be donated to the school. Then I drove to the school.

Foiled By Murphy's Law

I got to the school half an hour early so that I would have plenty of time to set up the computer. I lugged the computer into the classroom and started plugging in cables and cords. When I was done I turned on the computer and the TV.

Nothing happened. The TV screen was filled with static.

I fiddled with the channel selector. I checked all the connections. I took everything apart and plugged it back in.

Still nothing.

I turned around to face the class. I was going to tell the kids about finicky computers and Murphy's law. At the rear of the room I spotted about eight adults. While my back had been turned, the school principal and several teachers had slipped into the room for the demonstration. Instead of a demonstration all they got to see was me fussing and fuming at the dumb computer.

I was so embarrassed. There I was, a computer expert, and I couldn't even get a picture on the display screen.

I was afraid to look at my two kids' faces. I knew what they must have been thinking: If daddy's going to humiliate us this way in front of our teachers and friends, it looks like it's time to put him up for adoption.

Culture Shock

After a desperate phone call and a whirlwind trip back to the computer store for extra parts, I finally got the computer to work. Once it decided to work, the computer didn't embarrass me any further. It behaved itself the rest of the afternoon.

I finally relaxed. I popped disks into the disk drive and started showing off some of Catie and Eric's favorite programs—*Delta Drawing* (from Spinnaker), *KoalaPainter* on the Koala Pad (from Koala Technologies), *Rocky's Boots* (from The Learning Company), *Early Music* (from Counterpoint Software), *Math Maze* (from DesignWare), and *Bank Street Writer* (from Scholastic and Brøderbund).

I put the disks into the computer, and Catie and Eric demonstrated the programs.

We whisked through the programs at high speed. I was hoping to show about 20 programs in two hours. The kids in the class were "oohing"



Harry Blair

and "aaahing" appreciatively. Everything was going smoothly.

Then I ran into a brick wall.

"Those programs are all very impressive," a teacher called from the back of the room (the *very* back of the room). "But they are obviously intended for older children. Don't you have anything for the children in this room and for our kindergartners?"

Whoops

I didn't know how to answer her. I wanted to be flip and say, "Dear lady, both of my children use these programs without any supervision. Eric has been using some of these programs since he was only two years old."

I wanted to say that, but I didn't. It had begun to dawn on me that the computer programs I was demonstrating may have looked like fun to me and the kids, but to the teachers they looked like a cram course in calculus or electrical engineering.

The teacher who had spoken walked up to the front of the room. She pointed to the display screen. The menu to *KoalaPainter* was on the screen. "There must be dozens of different options on this screen," she said. "How can we teach our kindergartners to operate a program that is this complex?"

I explained to the teacher that little kids didn't think the program was complex. Eric, for example, pretended that the menu boxes were "doors." He

opened a door just by pointing to it on the KoalaPad. Then he went through the doors into different "drawing" worlds where he made multi-colored rubber bands, grew circles and squares, and drew shapes and pictures.

"Show her, Eric," I said. I picked him up and plopped him down in front of the computer. Eric showed her.

The teacher was unimpressed. "He can do all those things because you taught him," she said. "You're a computer expert. But you won't be in my classroom with me and my kids. Who's going to teach me? And how am I going to teach the kids?"

First Things First

At that moment everything became clear to me. I realized that, in my idealistic fervor, I was rushing in the wrong direction. I was trying to create new educational structures, but I was forgetting the basics. The first item on my agenda wasn't bridge building, it was *teacher training*. It would be pointless to stick computers in Catie and Eric's classrooms unless their teachers knew how to operate them and were comfortable with them.

What the teacher had said was true. The kids couldn't learn on the computers unless she taught them. And before she could teach them, somebody had to teach her.

That somebody was me.

The Prime Mover

Before I took the computer to my kids' school, I had thought that I was going to act as liaison between two ongoing computer learning centers. I saw the home as one learning center and the school as the other. The way I saw it, my job was to get the two centers communicating, sharing, and trading information and resources.

After my experience in the classroom with the kids and the teachers, I realized that, for a while, my job would be much more limited. Before I could coordinate the activities of the two learning centers, I would have to *create* them.

I realize now that I'll have to spend a considerable amount of time with the teachers to get them started using computers in the classroom. And I'll probably have to work with the parents to get them started using computers to help their children learn at home.

Before I begin building the bridge between the two islands of learning, I'm going to have to build the foundations.

Show And Tell At Home And At School

I've started inviting teachers from my children's school over to our house on evenings and

weekends. We are conducting an informal teacher training workshop, and we are screening the software that we plan to use in the classroom.

I'm learning a lot.

My next goal is to create a newsletter that the kids can take home to their parents. I hope that there are a lot of parents out there who know something about computers and who read the newsletter and get enthusiastic about my bridge-building plans.

I can use their help. They can work with the teachers and help train them on the computers. They can bring their computers to school for show and tell. They can share their software with the school.

Once the teachers are trained and we have a nucleus of committed parents, we can think about organizing a Parents and Teachers Computer Association.

For the moment, though, I've got my hands full training Eric's teacher on the *KoalaPaint* program. Like the other teacher, she is boggled by the screen menu with all its boxes.

Eric is helping me train his teacher. He is very understanding and very patient. Two nights ago, during a session, he pointed at the screen with the *KoalaPaint* menu. "These are doors into the computer," he told his teacher. "Which door do you want to open first?" ☺

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COMPUTING for families

New Standards For Home Learning Part 1

Fred D'Ignazio

Recently I read an article by a leading educator in which he called for standards for educational software for the home. "Who must design these standards?" he asked rhetorically. "We must design the standards," he answered emphatically, "because *we* are the experts."

But this is not necessarily true. Expertise in using computers in the schools may not carry over into the home.

Why? First, learning at home is not the same thing as learning at school.

Second, we are a long way from realizing the potential of learning using a computer. I have a strong conviction that there are whole realms of computer learning that we have yet to explore. If we were to establish a single set of standards right now, we would stifle software companies' ability to lead us into these new realms.

The Wild, Wild West

Computer learning, especially in an unstructured environment like the home, is a vast, unexplored terrain. It would be foolish to try to define and map this terrain even before we have explored it. We would end up roping off a small part of the territory to confine ourselves in. The rest of the territory, beautiful and vast, would remain beyond our reach and the reach of our children.

The present stage in home computer learning is like the days of the Wild West. We have all sorts of people in the home-learning software industry, including cutthroats, gunslingers, and the like. But we also have pioneers, scouts, traders, settlers, and explorers. And we have gypsylike Indians roaming freely through the whole terrain.

We certainly need some sheriffs and marshals in all this hooting rowdiness, in these gun duels and disorder. But we do not need an outside expert or government official to impose mock order by

garrisoning us off and forcing us onto tiny reservations. We still have too much exploring to do.

Structured Vs. Unstructured Learning

According to one expert, over 10,000 companies have already created over 40,000 software packages, any of which, potentially, could be used for learning. And, within another year, this number will double!

Much of the software is excellent. But there is also a lot of junk out there. And there is no way for the average consumer, a parent or a teacher, to separate the junk from programs that will help them or their children—especially since most software can't be previewed before taking it home.

People are concerned. It is natural for them to turn to government policy makers and educational experts for some help and respite. And when the policy makers and experts get involved, it will be natural for them to create a model for home learning based on learning at school.

Unfortunately, this would be a mistake.

Why? First, because learning takes place in school primarily in a structured environment, while learning at home is largely unstructured.

Second, learning at school takes place under the pressure and prod of a teacher's leadership, the school's disciplinary and academic atmosphere, and the competition, opinions, and watchful eyes of one's peers.

In comparison, learning at home is normally done in a psychological vacuum. Parents cannot hope to duplicate the school environment. Most parents do not have the time to play the roles, night after night, of cheerleader, coach, taskmaster, teacher, and friend that a learner, especially a young learner, often finds vital.

Learning at school is curriculum-based, cumulative, and progressive. It follows a well-

marked path laid out by the teacher's learning plan, by the school board, the boards of education and testing, and the committees of accreditation.

On the other hand, learning at home is ad hoc and sporadic; it happens in bursts. There is no curriculum or lesson plan to follow. There are no formal standards to meet, to fail, or to surpass. Learning at home is usually marked by the joy, the pain, or the insight of the moment, rather than the result of a coordinated plan followed over days, months, and years.

A Sense Of What Is Right

At school, a teacher can be a leader because he or she has some sense of what is right. This sense comes from training, years of experience, fellow teachers and colleagues, from the insights gleaned from professional books and magazines, and from attendance at conferences and meetings.

In contrast, at home a parent, as teacher, flies by the seat of the pants. Parents have to trust their gut feelings and their dim memories of being students themselves. Parents can certainly nag and demand that their children sit down and do their work, but they can't get them to learn—unless they can somehow lead them into learning. But how can a parent be a leader unless he or she knows where or how to lead?

A New Curriculum For Home Learning

Parents need guidelines for a home-learning curriculum. But it must be something totally new, unlike any curriculum found in school. And parents need help in making decisions as to which home-learning software they should purchase, and how to derive the greatest benefit from that software for their children.

They can't follow the school model. The school "carrots and sticks" will probably not work at home. Children who learn at home, over the long term, will need more incentive than their mom or dad threatening and nagging them, day after day, week after week. Children who learn at home will need software that inspires them, challenges them, and gives them free rein to learn independently and at their own pace.

Above all else, learning software for the home must be *entertaining*. The incentive for learning must come from learning itself. It cannot be imposed from outside. Otherwise, the long-term effect on the child is likely to be more negative than positive. Children will come to resent enforced learning on the computer just as much as I resented being "strapped into" the piano seat for a half-hour of practice every day when I was growing up. After eight years of this kind of "education" I came to hate the piano. Today, many years

later, I still have a mental block about sitting down at the piano and playing anything.

If parents are to succeed over the long run, computer learning at home must be fun, even joyful. And it must be meaningful to the child. The purpose and meaning of what the child is doing must be clear, not just to the parent, but also to the child.

Equally important, the child must have control over the direction and extent of his or her learning. Otherwise the child is an automaton or puppet, and will derive very little satisfaction, pleasure, or real learning from all those accumulated hours in front of the computer.

Opportunities For Home Learning

If school models for education are artificially grafted onto the home, computer learning could become very dreary indeed!

Yet something must be done.

Home learning using computers may soon be the complement to and the extension of learning in the school. Preschool children will learn at home on computers. School-age children will do their homework on computers and get remedial instruction. Handicapped children and those with learning disabilities will get valuable learning assistance from the computer to help them keep up with or even move ahead of their classmates. Talented and gifted children will be able to use the computer as a "Space Shuttle" of learning. They will be able to blast off into new areas, on their own, areas that challenge and stretch them to the utmost. They will be able to free themselves from the fetters and the crippling fear of failure they may feel in front of parents, teachers, and peers.

Computer learning at home will also be valuable as an "eleventh period." Children will be able to learn subjects and skills not offered by their school.

Adult computer learning, too, will be important. Schools will be able to provide "continuing education" courses for adults at home, using computers. Adults will be able to acquire valuable job skills and gain academic degrees by using computers to learn at home.

The Free Enterprise Model

Learning at home shouldn't be constricted by a school-like institutional curriculum or standards. Instead, new kinds of curricula and standards should be created, based on realistic conditions that exist in the average home.

Learning at home on a computer should be as diverse as possible to reflect different families' and individuals' interests, personalities, goals,

and abilities. Diversity in computer learning should reflect (and *enhance*) the diversity in people.

Educators need to work along with educational policy makers, parents, children, and computer users to come up with a diversity of new standards, materials, and curricula for home learning.

The best model for home learning might be a *free enterprise model*. Major government bodies, computer users groups, educators, private companies, and consumer groups should each come up with their own packages. There might, for example, be a McGraw-Hill Comprehensive Package of Computer Home Learning Materials, and other packages from Scott Foresman, Addison-Wesley, D.C. Heath, etc. There might also be packages from MECC (the Minnesota Educational Computing Consortium), the Apple Computer Company, IBM, Atari, Tandy, and, of course, Commodore. Consumers Union might have its own package. Children's Television Workshop, CBS Software, Scholastic, Reader's Digest, Sunburst Software, and HesWare might have their own packages.

Each of these packages would compete for the biggest share of computer users. Parents could read evaluations and descriptions of the packages, talk to dealers, and preview the software before choosing the package that was right for them and their family.

Extra-curricular Learning

Not all home learning should be curriculum-based. Not even if we redefine "curriculum" to be something appropriate for homes and families.

Many kinds of software companies should continue producing what they do best—one-shot, maverick programs that are unlike anything anyone has ever seen. These are works of art that delight, charm, entertain, and educate, all at the same time. They might not fit easily into a package or a curriculum, but they deserve to be seen and experienced by every family.

Also, there should be lots of room for content-free, "learning how to learn" software. I would welcome lots of new programs that don't teach us when the Pilgrims landed on Plymouth rock, or how to conjugate a verb in Spanish, or how to solve an algebra problem. Instead they would teach us to be better learners. These programs would help us in all our learning, at home and at school.

Furthermore, learning at home and at school are not always different. I think that many of the unstructured learning exercises targeted at the home could be used in special, unstructured learning times at school. And many types of

courseware aimed primarily for the school could be used, with proper materials and parental guidance, in the home. Above all, there should not be a wall separating learning at home from learning at school. Instead, it should be a broad, circular continuum that melts together and meets at either end.

Horse Breeders, Plumbers, And Brain Surgeons

Completely new modes of learning may be discovered yet.


A home-learning curriculum might be devised based entirely on real-world career domains. For example, all computer-based home-learning courses shouldn't just be on *knowledge domains*, such as Algebra I or language arts. Software companies should also offer children full-scale courses on how to be a space shuttle pilot, how to manage a nuclear reactor, how to be a software designer, a fashion photographer, a horse breeder, an archaeologist, a diplomat stationed in Latin America, an executive in a multinational corporation, a plumber, brain surgeon, or a police detective.

In these courses, knowledge domains would be subsidiary to *career domains*. Kids would pick up the physics, math, language arts, and social studies they needed to get their credentials in the various fields. The youngest kids would naturally become junior horse breeders and archaeologists. The models that they would have to master would be simpler, yet for them, no less exciting and challenging.

Older kids would have to work with more complex, lifelike models of the real world and of the careers they were studying. They would work for milestones like Apprentice and Assistant on the way to achieving mastery of the career.

Perhaps work-study internships could even be set up to coincide with advanced home-study programs for teenagers and young adults. Companies and government agencies could open their doors to student interns who had mastered their "career courses." In this way, young people could complement their home learning with on-the-job training and real-world experiences. Employers would benefit by getting to see a crop of enthusiastic, well-trained young people.

The programs of study should be diverse, entertaining, and short enough to encourage children to try as many careers as possible. The programs should be rewarding, playful, and encourage social and emotional skills as well as intellectual skills.

My thanks to the many industry watchers who, through discussions during the recent Consumer Electronics Show, helped contribute to the ideas in this article. 

COMPUTING for families

New Standards In Home Learning Part 2

Fred D'Ignazio, Associate Editor

Now that computers are going into the schools in record numbers, we are finally realizing that we have gone about things all wrong.

Before computers arrived in the schools, we should have laid some groundwork.

Parents need to be briefed. Teachers need to be trained. Schools need some way to purchase software, course materials, books, and magazines. Teachers need some guidelines for purchasing new computers, new software, new computer equipment and materials. Standards and procedures for product review and evaluation need to be agreed on.

Children need to be consulted.

Parent Training

The situation at home is even worse.

Computers are popping up by the millions at home. Parents who don't know anything about computers are running out and buying software, materials, and equipment based on dealer recommendations, the pictures on the software packages, and occasional reviews and recommendations they see in magazines and on television.

I think most parents are anxious and bewildered about computers. But they are also incredibly curious about what can be done. "How can my kids use this computer?" they are asking. "How can my kids use this computer to be happy and successful?" "What can my kids learn on this computer?" "How can my kids learn?" "How can this computer help my kids at home?" "How can it help them in their schoolwork, and prepare them for growing up?"

In school, people are finally realizing that teachers need in-service training in order to integrate computers fully into the schools.

And if teachers are getting training, why not parents?

Courses should be set up for parents to attend. The courses should be jointly created by teachers, computer vendors, parents, and children. The courses should concentrate on training parents on how to use computers as home-learning tools.

Learning at *home* should be emphasized. Parents should not be taught to copy what teachers are doing at school. The situation is different at home. Parents should be given the information and skills they need to cope with the problems they face at home.

A parent-training curriculum might include the following areas:

- Which computers best lend themselves to home learning?
- What are the best home-learning programs?
- Which new kinds of computer equipment can help home learning—like touch pads, light pens, speech synthesizers, and keyboard overlays?
- What materials should come with software to help guide parents and to supplement computer learning?
- What are some basic guidelines to help parents evaluate home-learning software and materials?

- Which publications, catalogs, etc., bring the best new equipment, software, and materials to parents' attention?
- What techniques should parents use to actually *shop* for and *purchase* home-learning materials?
- What are the best local stores—in terms of service, hand holding, training, and dealer support? What are the stores with the nicest, gentlest salespeople—people who like and understand children and who know how to talk in English?
- How can parents set up "user groups" of fellow parents who are interested in teaching preschoolers, elementary-age children, or secondary-age children, or handicapped or learning-disabled children, or children who need help in science, social studies, language arts, math, reading, or writing, or kids who are talented or gifted?

Learning By Surprise

Thanks to the computer, learning at home will soon be as important as learning at school. But it can't replace school. Nor should it try.

Computer learning at home should reinforce, complement, and supplement classroom-based education. Parents and teachers should work closely together to make sure that the mix of home and school learning is the most efficient mix possible and in the best interest of their children. Coordination is crucial.

The debate on home learning using computers has just begun. Most of the important subjects haven't even been covered—or discovered.

Education at school can receive important, surprising boosts from home computers. For example, let's say a child is having trouble with social studies at school. The child has the aptitude for the subject but is utterly bored by the material. Boredom and lack of interest are reflected in the child's grades and behavior in the classroom.

The parents could strap the child to a desk every night and require doing extra lessons and more time studying the boring textbook. Or they could purchase some of the new "social studies simulations" software. The software might turn the child into a cartographer to map out a newly discovered continent, or a population planner, or an advisor to President Lincoln during the Civil War.

The most important thing the software could do for the child is *bring the subject to life*. It could awaken the child's interest and bring an excitement to the subject which could transform the child's whole attitude and performance in the classroom.

Sharing Your Experiences

In upcoming columns I hope to explore some of the new dimensions of computer learning that *take us by surprise*.

Also, I'd like to hear from you. If you or your children have learned from the computer in some novel, unexpected way, please share your experience with me. Write:

Fred D'Ignazio
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Roanoke, VA 24015

To demonstrate that there are new, unexplored dimensions of computer learning, I am gathering stories and experiences for future publication in my various columns. I would love to hear from you!

Learning As Entertainment

Before you write me, I'd like you to think about something else, too. Then maybe you'll share your thoughts with me.

I think that computer learning at home may soon cease to be called "learning." Instead, we might end up putting it under the category of *entertainment*.

Think about it. The words *education* and *learning*, for many adults and children, have a negative connotation. For them, the experience of learning is associated with pain, embarrassment, tedium, and boredom.

Computer learning often isn't any different. But it can be.

Computer learning can be made so pleasurable, so joyous, and so rewarding that it may slip unnoticed into the category of "entertainment." It may become a new form of entertainment that feels good to a person at the same time it benefits and changes him or her in a substantial way.

If home-learning programs are designed with enough imagination, subtlety, and respect for people, they may soon become more popular than videogames were in their heyday. Families will gather around the computer, like an "electronic hearth." Instead of watching TV, they will spend many active, enjoyable hours together every evening learning new things on their computer.

And they won't think of it as work, learning, or education. They will think of it as entertainment.

Learning As Expression

In one of my recent columns ("The New King Of The Mountain" in the February GAZETTE) I showed examples of how computers can boost a person's abilities in art. The person in my article was my four-year-old son Eric, and I wrote about the amazing things he was able to do using the *KoalaPainter* art program and the *KoalaPad* touch tablet.

Computers can open new doors into areas of

self-expression we never knew existed.

New programs like *Music Construction Set*, *Micro Illustrator*, *MusiCalc*, *Delta Music*, *Fun Writer*, and *Word Vision*, allow us to express ourselves in colors, shapes, and designs, in words, and in music.

And we can start creating the moment we sit down at the computer!

Gone are the hours of manual-reading just to learn how to use the computer. Gone are the additional hours needed to master the technical complexities of drawing, sight-reading musical scores, composing, or typing on a standard typewriter.

With the right software, the computer can act as a booster and an amplifier for our skills and can enable us to directly tap our imagination and produce new creations in various media.

Most of us, by the time we become adults, walk around with a little "editor" inside our heads. Whenever we do anything the editor reminds us that we are either good or bad at that thing. It tells us whether we are knowledgeable or ignorant, skilled or unskilled. It assesses our past efforts and predicts whether our performance will be graceful or awkward, and whether the results will be elegant or ugly.

We pay close attention to our editor. Listening to the editor keeps us from making fools of ourselves in new situations. For example, by the time we are adults, if we haven't become accomplished musicians, writers, or artists, we shy away from these areas. We do not casually sit down with guitars, typewriters, or paintbrushes. We know how bad we'd look, and the kind of trash we'd produce. We know because our editor tells us.

But now we have a way of disabling that editor and, simultaneously, of being able to produce works of art that are beautiful and *personally satisfying*. We can do all this by using new kinds of computer tools.

Just The Beginning

But expressing ourselves is just the beginning. These programs should also act as a stimulus to get people learning more about the discipline of music, the discipline of art, and the discipline of writing.

New programs should pick up where these programs leave off. They should be more than "builder kits" and "construction sets." They should challenge us to a higher level of achievement in each of these disciplines, while rewarding us with beautiful creations along the way.

And why do we have to have construction sets for the arts?

Why don't we see mathematics construction sets, physics construction sets, chemistry construction sets, and biology construction sets?


How would you like to build a budding rose,

design a working star, or construct an erupting volcano? How would you like to create a *working* model of the human heart? Or construct a gene, a DNA molecule, a bacterium, or a one-celled amoeba then bring it to life?

The delight and thrill you'd feel wouldn't come just from the intellectual experience of building a computer model of a heart, an amoeba, or a volcano. It would come from creating a beautiful, emotionally satisfying work of *art*—like creating a pretty picture or a moving piece of music.

The computer's greatest value as a learning tool comes when it mixes process and product, when it blends the technical and scientific with the artistic, and when it frees us of inhibitions and taps our imagination, yet still challenges us to acquire more skill and do better.

Learning by surprise, learning through entertainment, and learning by expression are some of the ways computers can help people learn. They are ingredients for profound and permanent learning. These ingredients and many more, as yet undiscovered, should be present when we use computers to learn at home. They should be included in new standards for computer-based home learning.

My thanks to the many industry watchers who, through discussions during the recent Consumer Electronics Show, helped contribute to the ideas in this article. 

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COMPUTING
for families

The New King Of The Mountain

Fred D'Ignazio, Associate Editor



My daughter, Catie, was born in December 1975. My son, Eric, came along in April 1979, over three years later. Today Eric is four, and Catie is eight. When I look at Catie, she always looks bigger than I remembered. When I look at Eric, he always looks smaller.

Catie amazes me because she is growing up so fast. Eric amazes me because he is staying little so long.

I don't know how many times I have wished that, somehow, Eric would catch up to Catie. It's not that I wish Eric would physically grow as big as Catie. It's just that I wish he would be as *able* as Catie at lots of different things—things like

reading, writing, talking, listening, walking, running, minding his parents, drawing, painting. You name it.

This is a big secret that I'm telling you. I've never even shared it with my wife, Janet.

But I'm not the only one in our family who feels this way. Eric feels this way, too. I can tell just by watching him struggling to keep up with his big sister. No matter what Catie does, Eric is there, too, trying to do it. But he is always a little slower than Catie, a little less able.

That doesn't stop Eric from trying. In fact, I think it makes him try even harder. And it has made him pick up the habit of jumping into any situation, no matter how difficult and complex, with the expression: "I know how to do it. Let *me* do it."

Unfortunately, in most cases Eric *doesn't* know how. But that doesn't stop him from trying.

And it doesn't stop me from admiring him.

Eric makes me think of other four-year-olds, especially four-year-olds with older siblings. They must be a pretty hardy bunch. They are at the bottom of the family totem pole no matter what is going on. They always come in last. Yet they never stop trying. I think that's pretty amazing. I know I couldn't do it. It takes a lot of spunk.

The Great Equalizer

Last week we got a new computer product for our Commodore 64—the KoalaPad from Koala Technologies. The KoalaPad comes with a black plastic stylus (a pencil without a lead) and a software package, *KoalaPainter* from Audio Light, all for \$125.

KoalaPainter is a do-it-yourself, create-your-own pictures kit. It is also the great equalizer that has reversed Eric's position in the family. He used to be the least-accomplished artist in the group (with the possible exception of our fat black cat, Mowie). But now he is the best artist in the family (the best *video* artist). He is the king of the mountain. And he's loving his new position.

The Acid Test

The acid test for any new computer product is whether it lets people do something on the computer that either (1) they could not do without the computer, or (2) they could not do as well without the computer.

The KoalaPad and *KoalaPainter* have dramatically passed this test. Eric can do things now on the computer that he could never duplicate on paper. In fact, Eric can do things on the computer that I can't duplicate on paper or the computer. And I'm 34.

For a four-year-old, Eric is a pretty good artist. But, using crayons, magic markers, and paper, he is no match for his big sister or, for that matter,

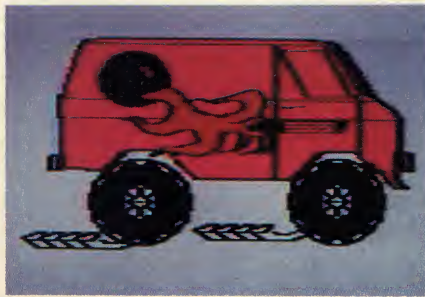


Janet or me. However, using *KoalaPainter* Eric is more than our match. Eric is now the reigning video-art champ of our family.

When Eric first boots up the *KoalaPainter* disk he sees a bunch of "menu" boxes on the display screen. When he presses the point of the plastic stylus against the KoalaPad, he sees a cross-hairs drawing cursor on the picture screen. By moving the stylus around on the pad, he moves the cursor on the picture screen from box to box.

The boxes let Eric choose the size of his paintbrush, the color of "paint," and the type of drawing he wants to do. Here are some of the boxes that hold Eric's drawing tools. With these tools Eric can:

- * **DRAW** Draw freehand.
- * **LINE** Create "rubber band" lines that stretch across the screen.
- * **LINES** Connect rubber bands, end to end.
- * **OOPS** Undo his most recent drawing command.
- * **FRAME** Make rectangular frames.
- * **BOX** Draw a framed filled in with a particular color.
- * **RAYS** Draw lines that radiate from a central point.
- * **XCOLOR** Change one color on the screen to a new color.
- * **COPY** Copy a picture or portion of a picture onto a new screen location.
- * **MIRROR** Create mirrored images simultaneously on the picture screen.
- * **CIRCLE** Draw circles.
- * **DISC** Draw circles filled with a particular color.
- * **FILL** Fill in any shape he creates with any color he chooses.
- * **ZOOM** Magnify a picture for detailed drawing, erasing, or changing.
- * **SWAP** View two pictures at the same time. Using the COPY command Eric can copy portions of one picture onto the other picture.
- * **STORAGE** Store his pictures on disk.
- * **ERASE** Erase the entire drawing area.



This sounds like an overly powerful array of tools for a four-year-old. Don't believe it. They boggle Janet and me, but they do not boggle Eric. He attacks *KoalaPainter* the same way he charges down the street on his Big Wheels bike—ZOOM!

Rough Drafts

Once, a couple of years ago, I had a conversation with Alan Kay, Atari's chief scientist for research and development. Kay is also one of the inventors of Smalltalk.

We were talking about the difference between a novice doing a task and an expert doing the same task. Kay said the key difference was that the novice was happy to do the task once, then go on to something else. The expert, on the other hand, did the task, then did it again and again to do it better. Each time the expert did the task it was like producing a "rough draft" of a writer's manuscript. The expert kept churning out new drafts. Along the way the expert polished, embellished, corrected, adjusted, and fine-tuned the product of his or her labors until it was done right. Then the expert went on to something else.

Why don't novices do rough drafts like experts?

They don't because usually it is too hard. They barely know their craft—of writing, painting, bridge building, cartwheel turning, driving, or whatever—and they usually work with primitive, amateurish tools. The expert, on the other hand, works with the finest tools technology can produce and is competent, disciplined, and experienced in the craft. The mechanical part of the work comes naturally, intuitively, and effortlessly. With the right tools and skill, the expert can reel off several drafts in the time it takes the novice to complete just one.

Computer Elevator Shoes

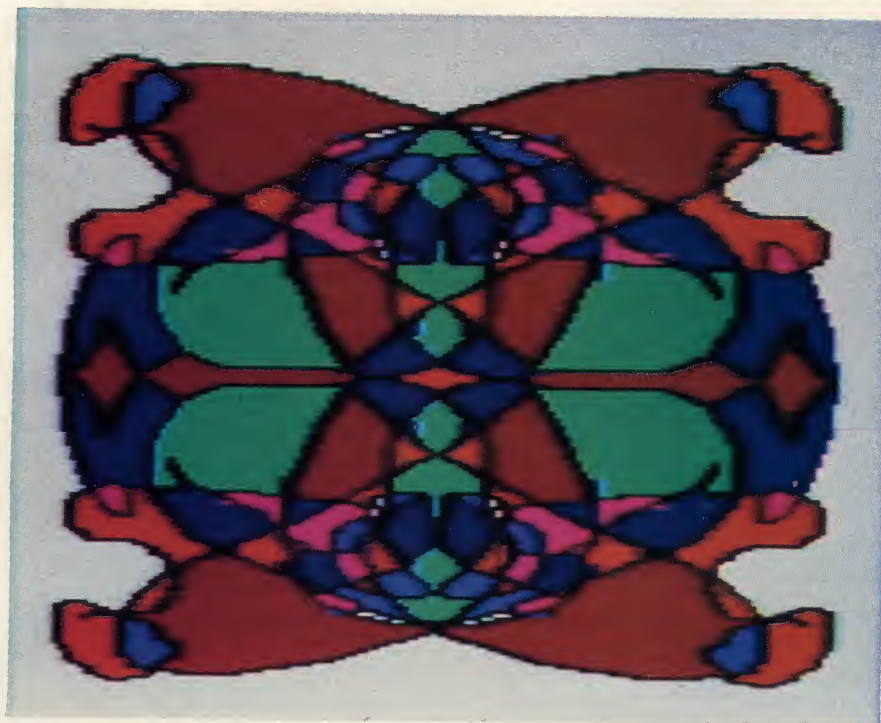
What happens, though, when you put a tool into a novice's hands that compensates for his lack of experience, his undeveloped motor and cognitive abilities, and his dearth of skill and craft?

KoalaPad's *KoalaPainter* is such a tool, and Eric is such a novice.

When I watch the beautiful pictures that Eric produces on the KoalaPad, it makes me think of a seesaw. Let's say I'm on one side and Eric is on the other. Usually, my greater size and weight makes the seesaw unbalanced. I drop like a stone, and Eric flies up in the air.

With *KoalaPainter* on his side, Eric goes down and I go up. What happened? It seems that *KoalaPainter* is a great equalizer. It amplifies and extends Eric's limited cognitive and motor skills





beyond my own. It also taps his unbridled energy and imagination. It harnesses his tremendous curiosity and his tireless capacity for exploration and discovery.

With *KoalaPainter*, Eric does *lots* of rough drafts. And he does them fast!

The Brick Wall

Watching Eric use the KoalaPad and *KoalaPainter* can be sheer delight. It is not sheer delight at all times, however. Eric creates new *KoalaPainter* pictures at 90 miles an hour. Sometimes he takes a wrong turn and runs, SMACK!, into a brick wall.

Not surprisingly, Eric does not like to run into brick walls. So what does he do?

Sometimes when he runs into a wall he backs up and tries a new path. Sometimes he tries climbing over the wall. Sometimes he tries to knock the wall down.

And sometimes he just sits there and howls.

Leonardo The Little

When Eric boots up the *KoalaPainter* disk he sees the menu with all the little pictures of brush sizes, paint colors, and activities. He never pauses to study this menu. Instead he presses the KoalaPad with his stylus, chooses a color, a paintbrush, an activity, and dives right into making a new picture.

I often wonder: Does he think that fast? Or is he in "playground" mode where he races from swings to monkey bars to merry-go-round ran-

domly and at top speed?

In any case, within seconds after turning on the computer, Eric has a new picture under way. And, more often than not, the picture is stupendous.

This is because, to create a picture, Eric has usually employed all the tools that *KoalaPainter* provides. All the tools. It may not be the most efficient way to make the picture, but it's Eric's way.

He uses the CIRCLE command to grow concentric circles of different colors around the screen.

He uses the MIRROR command and the RAYS command to create prickly sea urchins with purple and green spikes.

He uses the MIRROR command and the LINE command to create beautiful, layered tiles of multiple colors.

He uses the COPY command and the ZOOM command to create lots of tiny ERICs inside boxes, triangles, and circles, all over the screen.

He uses the ZOOM command and the BOX command to erase mistakes. The ZOOM command is good for erasing little mistakes. The BOX command is perfect for the great big mistakes.

Electronic Scribble

When Eric draws on a piece of paper on the kitchen table, he often just runs the pencil back and forth across the paper. To Eric this is great fun. To me it looks like scribble.

I think that what Eric is doing on the computer is scribbling, too. He is using the powerful tools made available to him by *KoalaPainter* and the KoalaPad to do advanced (super-advanced) scribbling. This is scribbling at a new plane—*hyper scribbling*.

Maybe the reason Eric is the family champ at video art is that he is also the family's best scribbler. The other family members just can't compete. As Catie grows older, she is losing her ability to scribble. And with Janet and me, it's a lost art.

But Eric is a master scribbler. And, with the Koala tools in his hand, he is also a budding video artist. Maybe these tools will even arrest his development. Maybe he'll keep scribbling forever. And his scribbles will just keep getting more and more complex, and more and more beautiful.

Koala Technologies
4962 El Camino Real, Suite 125
Los Altos, CA 94022

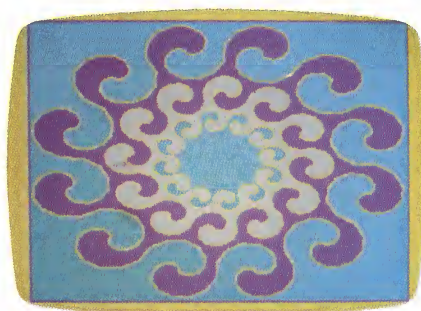
COMPUTE!'s GAZZETTE™

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For Owners And Users Of **Commodore VIC-20™** And **64™** Personal Computers

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All you have to do is pick up the toolboxes scattered throughout the building. Seems easy enough. But watch out for the broken ladders, holes in the floor, and tumbling barrels....



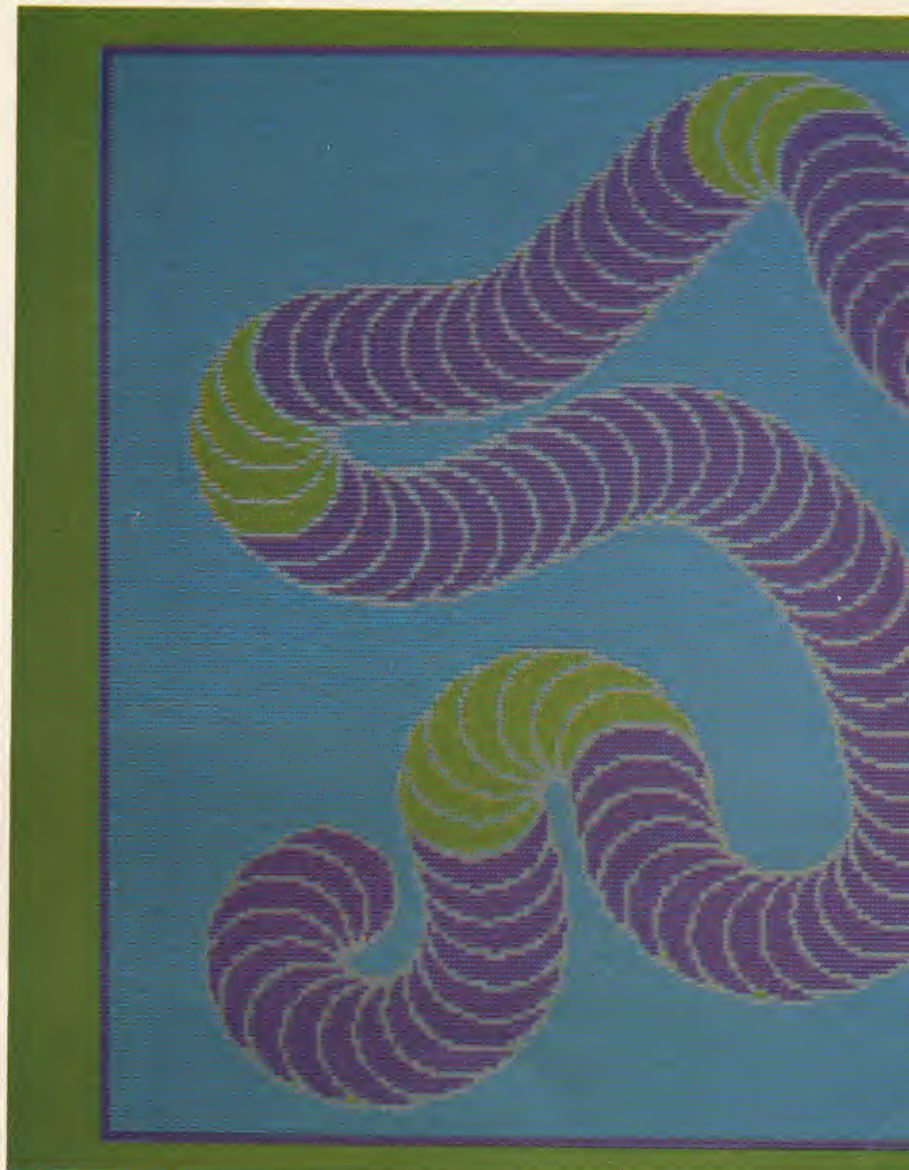
COMPUTING for families

New Family Learning Games

Fred D'Ignazio, Associate Editor

This month COMPUTE!'s GAZETTE is consolidating two previous columns—the monthly “Computing For Kids” and the bi-monthly “Computing For Grown-Ups”—into one new monthly column, “Computing For Families.” Each month, Computing For Families will cover topics of interest to all members of home-computing families, both young and old. And as before, the column will be written by Fred D'Ignazio, himself the head of a home-computing household.

These colorful designs and the ones on following pages were created with Spinnaker Software's Delta Drawing.



Ambushing The Mailman

When I was a kid I used to belong to all sorts of mail-order book clubs. When I knew a book was coming I would rush home from school or spend an entire Saturday prowling around my front yard waiting for the mailman to pull up our driveway. It was a great feeling when he brought a big box addressed to me. I knew that a new book was inside the box. It didn't matter that I could never remember what book I had ordered. That was part of the fun.

Now I have two children (Catie, 8, and Eric, 4) who have followed in my footsteps. Catie and Eric get as excited as I did about receiving packages in the mail, and they are as good as I was at ambushing the mailman. On Saturday mornings, they lie in wait behind two big pine trees just outside the porch door. When the mailman arrives they spring out and grab all his packages and run into the house. They reach the living room, and

they start ripping the packages apart.

But do you think they are looking for books?

Nope. They are looking for new computer learning games arriving in the mail. And they act like wild things until they unwrap the games, load them into the computer, and begin playing them.

Champions And Cheerleaders

Here, below, is a group of seven games that captivated me and my family. They are remarkably diverse and quite varied in the thinking and skill they demand from the human player. But they are similar in four key traits. First, they are just as much fun for adults as they are for kids. Second, they can be played at many different levels, so, with help from an adult, even a toddler can benefit from them. Third, the games are constructive and nonviolent. They let families build things rather than train them in creative destruction. Fourth, the games are much more fun when people play them together.

All these games encourage interaction among family members, schoolmates, and friends. At our house we almost always play the games together. The approach we use is to have one person step forward as the stalwart champion and have the other family members be coaches, cheerleaders, and the peanut gallery. At the end of each game we rotate all the roles.

Playground Or Swamp?

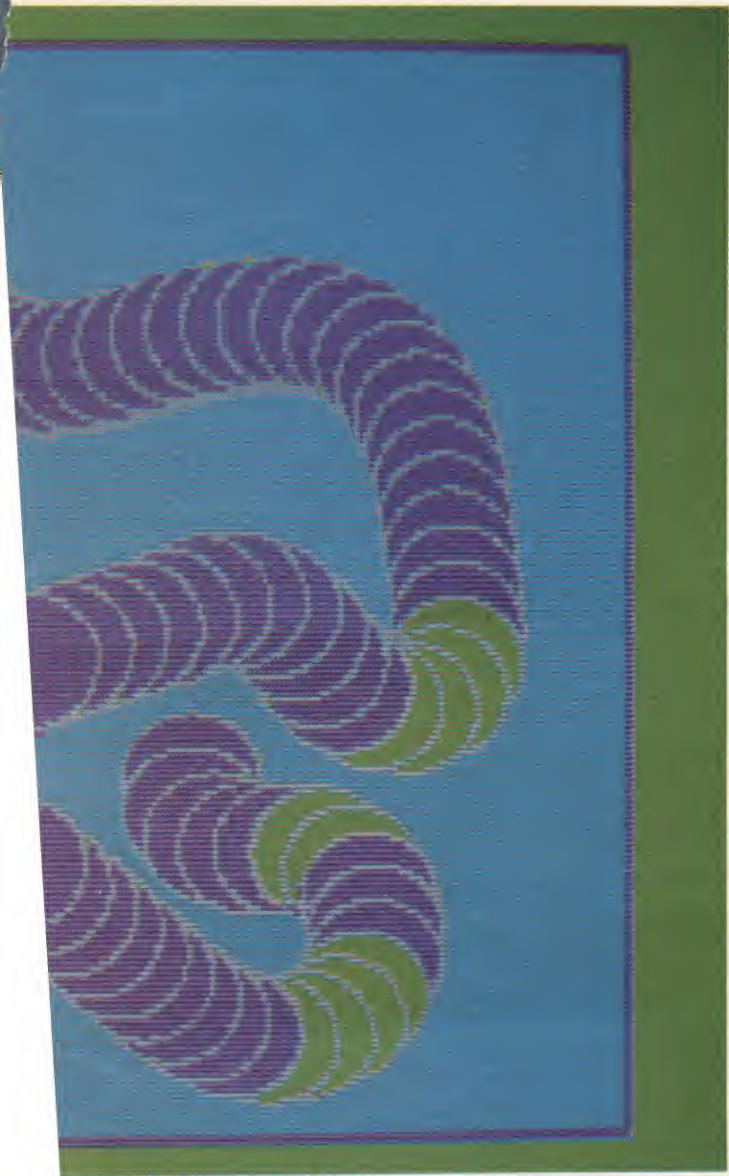
It was interesting to see Eric and Catie approach these new games. They never want to read any directions before starting. They equate direction-reading with "adult," "slow," "dense," and "boring." On their own, they never read directions—*unless they appear on the screen*. They just boot up a disk or plug in a cartridge. Then they start madly pressing buttons or swiveling a joystick or game paddle. Pretty quickly something begins happening. Then it's "play it by ear" all the way.

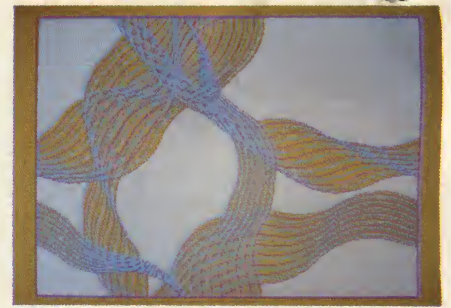
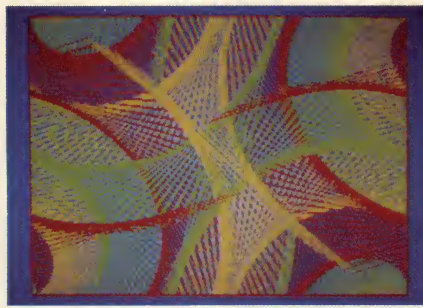
This sort of approach makes me very nervous. Nevertheless, I usually climb aboard for the ride, just to see where we'll all end up.

Most of the time, the kids wander through a program—at a gallop—and usually figure out what's going on. Then they begin playing with a passion.

But sometimes their approach is akin to turning down a blind alley and running, full-speed, into a brick wall. Then, with their noses out of joint, the kids turn around to me and announce, "Daddy, this is a dumb game!"

And, that's that. When the computer doesn't respond, when my kids feel powerless and out of control, they abandon the game. It's like watching their playground turn into a yucky swamp. While it's still a playground they love to race around





and use the equipment. But when suddenly the ground turns into sticky glue, the kids feel paralyzed.

I used to think they had reached a real dead end. Now I look at it as an opportunity to start doling out some game rules and special "power" buttons that get the game moving again and put the kids back in control.

Pipes

Pipes is available on cartridge for the VIC-20 (\$29.95) or the Commodore 64 (\$34.95). It won the 1983 CES (Consumer Electronics Show) Software Showcase Award for Home Education. It is made by:

Creative Software
201 San Antonio Circle
Mountain View, CA 94040
(408) 745-1655

Pipes is a game that never turns into a swamp. When the program begins there is a plumber, a house, and a water supply tank on the display screen. On the far right is a pipe factory with bins full of pipes of all shapes.

My kids were puzzled by *Pipes* at first. But that didn't stop them from leaning on the joystick and racing the little plumber around the screen. They learned how to use the "radar" display—a little window in the corner of the screen that lets you see the plumber, the house, the water tank, and the pipe factory, all at the same time. And, by randomly pressing the joystick buttons, they discovered they could buy pipes from the factory and hook them up to the house and the water tank.

The first couple of times we played the game the kids created some pretty weird plumbing. Pipes squirreled out of the house, then corkscrewed, pirouetted, and pretzeled themselves into oblivion. We found out how to turn on the water supply (by pressing the V key on the computer) and squirted water all over the ground with ecological abandon.

Eventually we ended up with some pretty decent plumbing. The pipes went in efficient right angles out of the water tank and into the house. When we turned on the water, it flowed in a direct route from the tank to the house.

After hooking up the plumbing to one house had become a snap, we graduated to a whole

neighborhood with up to five houses. We even figured out how to do the plumbing with the cheapest pipe and save the most money.

Now the kids mostly play *Pipes* alone. The other day I went into the dining room and found Eric busy building a circular pipe network out of the water tank. I frowned and screwed up my face. "Why would you want to do that?" I asked him.

"Because," he said, not looking up, "this way the water never goes away."

Delta Drawing

My daughter Catie and I reviewed the Apple version of *Delta Drawing* in the June 1983 issue of *COMPUTE!* Magazine. Now Spinnaker Software has released *Delta Drawing* on cartridge for the Commodore 64 (\$39.95). You can reach Spinnaker at:

Spinnaker Software Corporation
215 First Street
Cambridge, MA 02142
(617) 868-4700

The Commodore 64 version of *Delta Drawing* is significantly more powerful than the earlier Apple version. And the Apple version was a knockout.

Catie and I found *Delta Drawing* to be a lot like Logo—only upside down! To make the Logo turtle do something you have to define a procedure (or program) and type in lots of one- or two-letter commands. Then, when you're all done, you have to type the procedure name to make the turtle do its tricks.

This kind of programming is called delayed gratification. It requires a lot of patience—especially when you are only four years old.

Delta Drawing is just the opposite. The payoff comes at the beginning *and* at the end. Here's a typical session with Eric:

Eric plugs the *Delta Drawing* cartridge into the Commodore 64, and, a moment later, a triangle and a blinking dot appear in the center of an empty screen. The triangle is "DeeDee" the turtle. The dot is DeeDee's tail. DeeDee uses her tail to draw.

Eric starts DeeDee on a trip across the screen by pushing the D key (for Draw). DeeDee moves about a quarter of an inch up the screen, then stops. Behind her is a white line.

Eric pushes the D key again, then the R key (for turn right 30 degrees) three times. Then he



pushes the S key.

Eric has made DeeDee do something significant by pushing just five buttons. First, he has made DeeDee move and draw a line—as soon as he presses the button. (This is called immediate gratification.)

Second, he has just created a *program*. The program is extremely simple, but it will act as a building block for the shapes that Eric is planning to make DeeDee draw next.

Eric saves his program by pressing the S key. (At this point Eric's daddy likes to press the T—Text—key to see the actual commands Eric has given DeeDee. This reassures Eric's daddy that Eric is, in fact, creating a real program. Eric, however, is confident that he is programming even without seeing the list of commands. He can see that his programs are working by watching DeeDee whiz around the screen drawing the shapes he has dreamed up.)

When Eric presses the S key the screen goes blank and DeeDee reappears in the home position. With only a moment's hesitation, Eric presses the X and the 1 buttons to run Program 1. DeeDee spurts forward two paces and turns right. Behind her is the straight line.

Eric presses the X and 1 buttons three more times. When he is done DeeDee is back in her home position. She has just drawn a square. Eric types the R button to turn DeeDee 30 degrees to the right. Then he types an S to save his second program.

Next Eric presses the X and the 2 keys seven times to run Program 2 seven times. When he is finished he smiles. DeeDee has just created a flower made up of little boxes rotated around a central axis.

Is Eric done? Not yet. He likes flowers so much he wants them all over the screen, and he wants them in different colors. He presses a couple more keys and colors the flower petals orange and blue and green. Then he presses the M button and holds it down. DeeDee scoots up the screen. Eric presses the S button to save his third program.

Now he's finally ready to do his picture. To make the picture he uses the building block Programs 1–3 that he has just created. To fill the screen with colorful flowers, he has to press only two keys: the X and the 3. Each time he runs his third

program, DeeDee draws a flower, colors it in, then zips to a new part of the screen.

Pretty soon Eric and DeeDee have filled the entire screen with flowers. Eric is done. He gets up from the computer and goes looking for his family to show off his latest creation.

The Tip Of The Iceberg

Delta Drawing is a spectacular learning game. I have described only a tiny bit of what kids can do with it. But the neatest thing about *Delta Drawing* is that children can explore all its powerful features, or they can spend hours on a single part of *Delta Drawing* and still not exhaust it. The program is made for children to explore. And if my children are any guide, they love doing it.

Kids On Keys

Kids on Keys is available from Spinnaker Software. The Commodore 64 disk costs \$29.95; the Commodore 64 cartridge costs \$34.95.

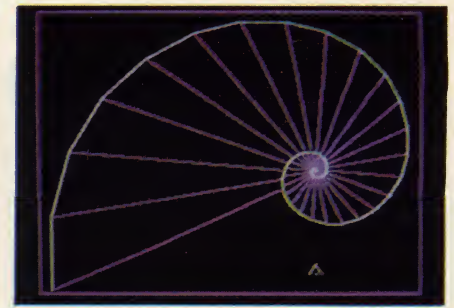
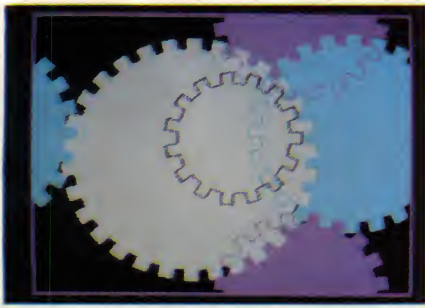
Kids on Keys is one of those programs that my family ought to like. It teaches all sorts of good things like the alphabet, shapes and colors, problem-solving, and, last but not least, the computer (or typewriter) keyboard.

It turns out that my family really does love *Kids on Keys*, but not because it teaches all that sound educational stuff. We love it for lots of little intangible reasons, like the neat music it plays. Or like the little person who whimsically floats up and down in a balloon. Or the way the letters we correctly identify make a loud *BURP!* and crumble like cookies. Or the funny way the cats, rabbits, boots, and faces fly off the screen after we correctly identify them.

Somehow, subtly, and disarmingly, *Kids on Keys* is charming. So we all love to play it. (Even though some of us are 34 years old, and we're supposed to already know our alphabet.)

And for those adults out there who are snickering in their sleeves, I dare you to try *Kids on Keys*, Game 3, Level 4. Just try to guess all those fragmented shapes, especially after they have changed color and scrambled their positions. Let me tell you, it is no laughing matter. Especially since the key word is quickly fading away.

How well-developed is *your* skill of pattern recognition? Play *Kids on Keys*, and you'll find out.



Alphabet Zoo

Alphabet Zoo is also available from Spinnaker Software. The Commodore 64 disk costs \$29.95; the Commodore 64 cartridge costs \$34.95.

Alphabet Zoo is a trip—a trip into a dark maze filled with colorful glowing letters. At the heart of the maze is a fox or a vase or a bottle of ink or a pair of socks (or dozens of other objects). Your goal is to guess the first letter in the object's name (like "f" for fox or "s" for socks). Then you run through the maze and chase down that letter. The letter skulks around the maze trying to elude you, but you can enter special doorways and take shortcuts through the maze. When you capture the letter, the computer plays a musical tune, you win points, and you get plopped down in a new maze with new letters and a new object.

Alphabet Zoo is very flexible. You and your child can play alone or together. You can choose to chase down capital letters, lowercase letters, or a mixture of both. Also, you can graduate to game 2 where you have to chase down entire words that match the picture in the maze's center.

There are six levels in each game. This lets your child work on different types of letters and words: easy and difficult consonants, vowels, etc., and words of anywhere from two to nine letters.

Alphabet Zoo is a valuable game for you and a child to play. It teaches all sorts of reading readiness skills, including letter recognition, letter sequence, and letter sounds. And having to chase the letters around the maze helps children develop fine motor skills that they will need when they begin writing.

All these things are terrific, but I've saved the best part for last. When you start each new trip into the alphabet maze, you get to choose your own player-creature. And the creatures are hilarious. One is a plump, pumpkin-like happy face. Another is a little, excited monster who keeps jumping up and down.

All the player-creatures are very lovable. Making them hop and bump their way around the maze hunting letters is a big part of the game's charm. And that's the secret of a good game. The game has worthwhile goals and desirable rewards. But it's also fun just playing. You and the child will still enjoy yourselves even if you never do track down one of those tricky letters.

Cosmic Life

Cosmic Life is available from Spinnaker Software. The cartridge for the Commodore 64 costs \$34.95.

Cosmic Life originated long, long ago, in the mists of time, before the Apple, before the PET, and before the TRS-80.

In that long-ago time there was a math wizard named John Conway. Conway created a game called *Life*. In Conway's little world, creatures lived according to three very simple rules:

- Survival

Every creature with two or three neighbors was happy and survived until the next generation.

- Death

When a creature was surrounded by four or more neighbors the creature felt overcrowded, became sad, and died. If the creature had only one neighbor or no neighbors at all, the creature became lonely and died.

- Birth

Whenever three creatures got together and shared an empty space, they produced a new creature for the next generation.

Conway published his game of *Life* in *Scientific American* over ten years ago. But it wasn't until recently that Ken Madell, the author of *Cosmic Life*, showed Spinnaker that he could convert Conway's intellectual parlor game into a fun computer learning game for kids and adults.

The creatures in *Cosmic Life* are known as Digi-Bugs, cute little *Pac-Man*-like creatures. They are born, they live, and they die according to Conway's original rules.

When you play *Cosmic Life* you begin with a barren, uninhabited planet. You pilot a joystick-controlled spaceship down to the planet and begin seeding it with Digi-Bugs.

Then prepare to be entranced. Digi-Bug colonies start popping up all over the screen. The little creatures grow, multiply, dwindle, and disappear, right before your eyes.

You can set everything in motion, then retreat to a cloud to watch the action, or you can dive your spaceship back down and continue to seed the planet's surface with new Digi-Bugs.

Pretty soon you will develop a real affection

for the little creatures. You will learn what patterns help them grow and which patterns make them sad and vanish.

Something happens each Digi-Bug day. Each day lasts about four seconds. You can create a game of anywhere from 10 to 250 Digi-Bug days. At the end of each day the computer scores points based on how many Digi-Bugs are currently living on the planet. Your goal is to create settlement patterns for the Digi-Bugs that make them happy, fruitful, and fertile. But you have to keep a balance. If your Digi-Bug planet gets too crowded, the Digi-Bugs will start disappearing again.

Up For Grabs

Up for Grabs is also available from Spinnaker Software. The program costs \$39.95 and comes on a cartridge for the Commodore 64.

Up for Grabs is supposedly for kids eight and up. But it is an instant swamp for kids, and maybe for adults, too. This is not to say that the program is not fun, because it is fun. But *Up for Grabs* is not an intuitively charming game like the other games above. It takes lots of practice and you'd better read the instruction book if you want to know what's going on.

Up for Grabs is an electronic *Scrabble* game. A cube spins around in the center of the screen. On each of the cube's faces is a letter. The letter rotates around, in view, then disappears. When the cube face comes around the next time, a new letter has replaced the old letter.

You pick a letter by pushing the button on your joystick. An arrow appears and points, in turn, at each of the letters on the cube that are visible. When the arrow points at the letter you want, you press the joystick button again.

There are four letter boards for up to four *Up for Grabs* players. Once you have chosen a letter, you can place it on one of the squares on your board by manipulating a row pointer and a column pointer.

When Catie and I first tried playing *Up for Grabs* without reading the directions, we got nowhere.

Later, my wife Janet and I played. Janet spent most of the first couple of games fuming and fussing at the computer. She claimed it was stealing her letters, putting them on the wrong squares on the board, and substituting other letters for the ones she'd chosen.

I had the same problem.

But then things started improving. We got better at manipulating the letters and the game boards. All of a sudden, we were hooked. We played game after game.

We kept playing. I looked at my watch. It was ten o'clock, it was a school night, and the kids were upstairs noisily dismantling their bed-

rooms. But Janet and I played on.

If you like *Scrabble* and you are a patient learner, you'll like *Up for Grabs*.

Tonight I'm going to talk to Catie. I'm going to try to persuade her to give the game a second chance. I think it's worth it.

Fraction Fever

Fraction Fever is available from Spinnaker Software. It costs \$34.95 and comes on a cartridge for the Commodore 64.

This is one of the most frustrating yet most addictive games I have ever played. (Spinnaker recommends *Fraction Fever* for people eight and up. *Fraction Fever*, *Up for Grabs*, and *Cosmic Life* are the first three games in Spinnaker's Family Learning Game series.)

The game is not a swamp, it's just so darned tough!

When you enter the world of this game you become a little person on a pogo stick. You start bouncing the pogo stick around on the bottom floor of a crazy, 20-floor building.

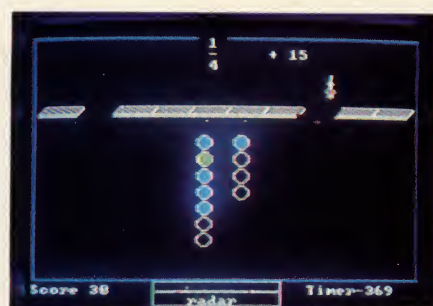
As you bounce the pogo stick, using your joystick, you discover boxes beneath the floor at intervals. The boxes, some filled and some empty, represent fractional quantities. Your goal is to find a group of boxes that matches the fraction hovering in the top-center part of your screen. For example, let's say the fraction is $\frac{1}{2}$. You would bounce your pogo stick until you found, say, four boxes together where two boxes were full and two were empty. When you bounce onto the square with these boxes you press the joystick button.

A neat thing happens. A *fraction elevator* springs out of the floor, picks you and your pogo stick up and carries you to the next floor. You bounce off the elevator and begin hunting boxes to match with a new fraction that is displayed at the top of the screen.

One of the best features of this game is the pogo radar. The little radar screen shows the floor you are on and the floor above and the floor below, each in a different color.

The radar is important because you can use it to estimate where you will find the boxes to match the fraction. The boxes are like distance markers. The fraction they represent is equal to the portion of the whole floor you have traveled, measured from left to right. For example, if you are trying to find boxes representing $\frac{3}{4}$, you can locate your little pogo-stick person on the radar, then bounce him three-quarters of the way along the floor to the right.

When you find the boxes—four of them, three full; or, perhaps, eight of them, six of them full—you have three visual matches for a particular fraction. First, you have the fraction itself ($\frac{3}{4}$) in



Alphabet Zoo by Spinnaker Software.

Kids on Keys by Spinnaker Software.

Fraction Fever by Spinnaker Software.

the upper part of the screen. Second, you have the four boxes (three full out of a total of four). And, third, you can see the little pogo stick on the radar, and it is exactly three-quarters of the way along the floor (measured from left to right).

The radar is also important because it warns you that holes in the floor are close by. If your pogo-stick person drops through the hole, he falls to the next floor below. This doesn't hurt him, and he can summon the fraction elevator to go back up by matching a new fraction to new boxes. But he can only fall ten times. After that he runs out of pogo sticks.

Where did the holes come from? The only way to get points in this game is by punching holes in the floor with your pogo stick. You get points each time you punch a hole in the floor over a set of boxes that do *not* match the fraction that is appearing on the screen.

But watch out. You have to punch and run, or else you will drop through the hole you just created and fall down to the floor below.

And there's the rub. Those holes are a darned nuisance. The first few times I played *Fraction Fever* I deliberately punched lots of holes to score lots of points. But then my floors had holes everywhere, and I ended up falling down a hole before I could find the correct boxes and catch a ride upward on the fraction elevator.

So I changed my tactics. I tried to get to the topmost (20th) floor first. Then I planned to work my way backwards, punching holes and falling through the floor.

This tactic worked fine until the 16th floor. Then the boxes changed to partly filled beakers. I had to see if the current fraction matched the amount of liquid in the beakers, and then check to see if the partly filled beakers matched the portion of the floor I had traversed. By the time I went through all this estimating and guessing, my time would run out and I would have to hop off the current floor (or fall through a hole) and drop to the floor below. Then the timer would start again and I would try to match the fraction, the beaker, and the floor, and catch another ride upward on the fraction elevator.

Unfortunately, I kept timing out and falling

through holes faster than I could estimate fractions. Pretty soon I was back near the bottom of the building with no more pogo sticks to bounce on.

Now I'm a veteran of *Fraction Fever*. Even so, I've never made it past the sixteenth floor, and I've never scored over 16 points.

But I'm going to keep trying. And because I'm persisting, I'm becoming a better fraction-guesser and a better pogo stick bouncer.

I just wish that Tom Snyder, the designer of this game (along with other Spinnaker best sellers, such as *In Search of the Most Amazing Thing* and *Snooper Troops*), would have been more generous with his point allotment. After scoring thousands of points with videogames, I found it quite hard to be content with scores like 6, 11, or 3.

Also, I would have loved it if Snyder had awarded me points for guessing the correct fraction rather than for punching holes in the floor whenever I spotted an incorrect fraction (or group of boxes representing a fraction).

Last, I wish that Snyder had designed the game with several levels, including three or four below the level the game operates at now. I can live with the knowledge that I've only made it to the sixteenth floor (that's $\frac{16}{20}$ of all the floors, or $\frac{8}{10}$, or $\frac{4}{5}$, or four full boxes out of a total of five). But it would have made it easier for me to get Catie and Eric past the first floor.

I've caught a terminal case of fraction fever. Now I'm anxious to pass it on to my kids. ☹

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4550 Murray # 81
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Computer Graphics

The Age Of Electronic Art

Fred D'Ignazio, Associate Editor

Let's imagine we have a time machine. We climb on board. We shut the door. We set the controls for Cambridge, Massachusetts, in early 1961.

The time machine whirs. Our stomachs feel queasy, as if we were on a rapidly falling elevator.

The whirring stops. The door opens.

We are in a darkened laboratory. The hulking forms of giant computers tower overhead and surround us. In the laboratory is a young man, unshaven, gazing at the screen of a computer terminal.

The young man is Ivan Sutherland. Ivan is a graduate student at the Massachusetts Institute of Technology in Cambridge. He sits, frozen, in front of the computer. It is 3:30 in the morning. His wife and kids are home sleeping. But here he is, dead tired, half-asleep, and eyes glazed. Yet he has to be here. It is the only time he is allowed on the computer.

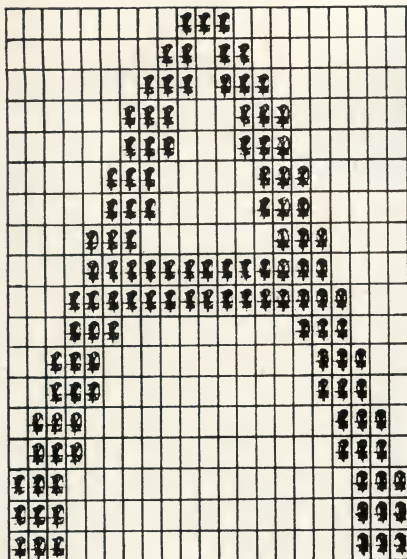
Sutherland stares at the computer screen. A shape appears. Sutherland grins. "Yaaaaaa-hoooo!" he cheers. He dances around the deserted lab.

Why is Sutherland so happy? Because he has just become the first human being to teach a computer to draw.

On the screen was a straight line. That's all: just a straight line. It was special because it was the first line ever drawn by a computer – and because it opened a whole new age of electronic art.



More simple graphics: a giant letter A made from several characters printed one on top of the other with a printer. Note that the A is printed on a graph-paper grid of little blocks. (Reprinted from Creative Kid's Guide to Home Computers by permission of Doubleday & Company.)



Sutherland was excited about what he did. But he didn't stop there; he went on to teach the computer how to draw new things. He taught the computer to change the straight line into an elastic rubber band. He had the computer bend the line, shrink it, and stretch it.

He taught the computer to draw other shapes, too: circles, triangles, squares, and polygons. He taught the computer to spin the circles, rotate the triangles, and fold the squares like pieces of construction paper.

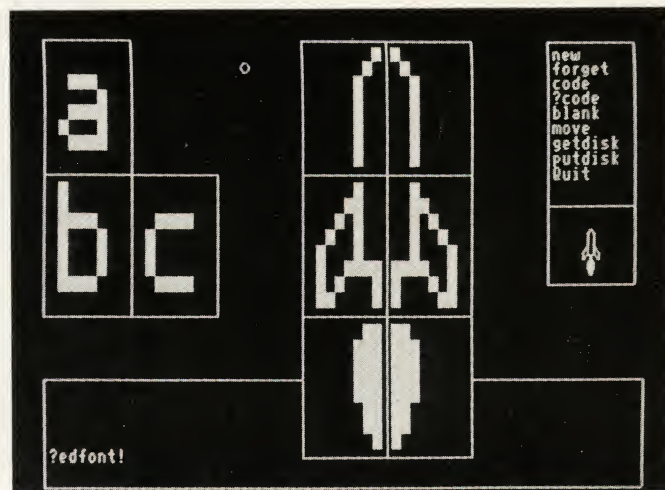
Sutherland published his findings in a book called *The Electronic Sketchpad*. His enthusiasm and knowledge about computer art inspired a whole generation of young people to learn how to teach computers to draw pictures.

Sutherland and his friend, David Evans, moved to Salt Lake City, Utah, and founded the

world's best computer graphics company, Evans & Sutherland.

Evans & Sutherland now builds million-dollar flight simulators for the U.S. Air Force. The simulators look like the inside of an airplane's cockpit – except that the “windows” are all computer screens. When a pilot trainee operates the controls of the plane, he or she is really controlling the computer. The computer images on the windows look like what pilots would see if they were flying a real plane.

Sutherland and his graphics computers are world-famous. Yet it all started one cold, dark morning when he taught a computer how to draw a straight line.



You can build complicated shapes by combining simple, rectangular building blocks or special graphics characters. Shown are three letters of the alphabet and a rocket. When the rocket is reduced, it becomes much more realistic. (Photo by Alice Collette. Courtesy of Rosetta Inc. Reprinted from *Small Computers* with permission of the publisher, Franklin Watts.)



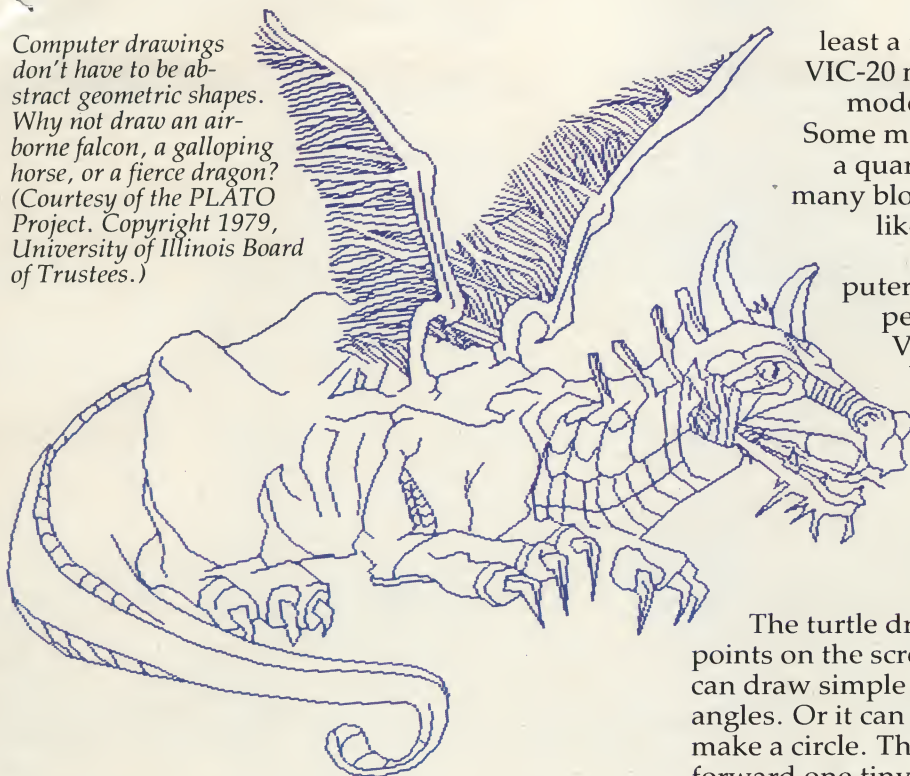
Picture of stars, Earth, and the Starship Enterprise. A computer program lights the pixels on the TV screen. (Courtesy RCA.)

Amazingly, your average personal computer is more powerful than Ivan Sutherland's warehouse-sized computer of 1961. Also, many of today's personal computers have graphics commands built right into their BASIC language. Sutherland had to program his computer to draw by feeding it commands written in long, snake-like strings of binary 1's and 0's. Modern computers can draw pictures with English-like commands such as PEN DOWN, DRAWTO, PLOT, and FILL.

Also, Sutherland's graphics were all in black and white. But today's computer graphics can be in color – from 16 colors on a VIC-20 and Commodore 64 up to 256 different colors on some machines.

But no matter how complicated computer graphics get, they must be built in one of three ways.

Computer drawings don't have to be abstract geometric shapes. Why not draw an airborne falcon, a galloping horse, or a fierce dragon? (Courtesy of the PLATO Project. Copyright 1979, University of Illinois Board of Trustees.)



First, you can use letters or special graphics characters and combine them into some kind of shape. The shape might be a giant letter A, a monster's face, or a skyscraper. These kinds of graphics are holdovers from the days when most computer terminals used paper printers instead of video display screens.

Another way to draw pictures on a computer's TV screen is to divide the screen up into tiny blocks called *pixels* (for *picture elements*). The picture is built by filling in the blocks. It's like drawing rough pictures with graph paper and magic markers. Using this technique, you can make pictures of spaceships, human stick figures, or running horses.

Computers that can display large numbers of very small pixels are capable of creating images with finer resolution. The more pixels, the better. If your TV screen is divided into thousands of tiny building blocks, then the pictures look smooth and realistic. On the other hand, if the building blocks are big, then the pictures appear blocky and rough. The image which opens this article was created on a computer with ultra-high resolution – millions of pixels.

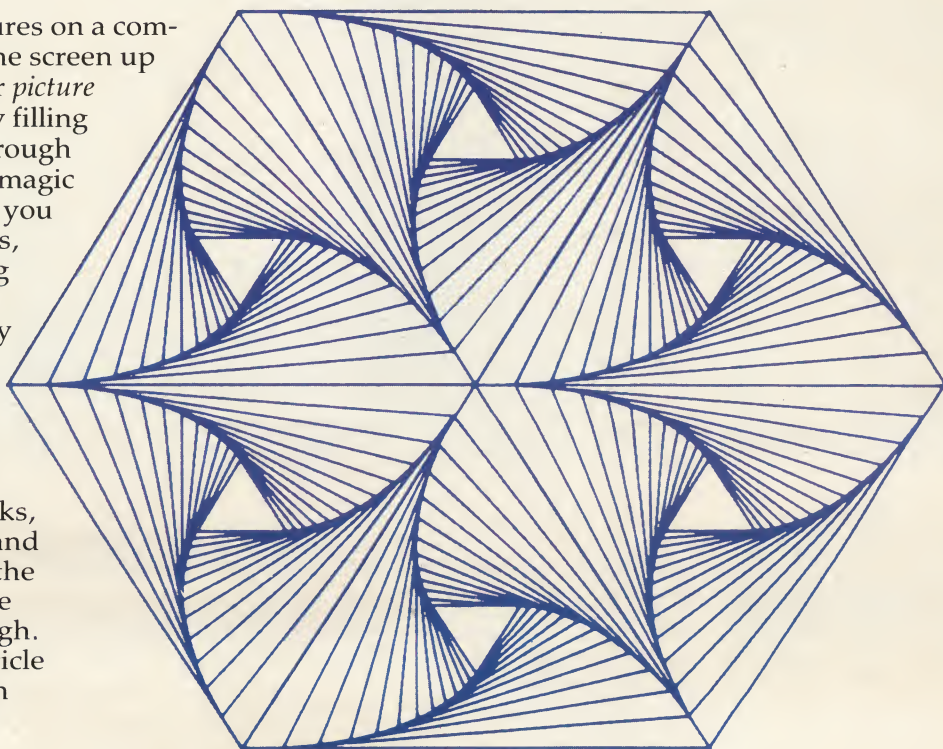
Most personal computers let you draw pictures using at

least a thousand blocks per screen. The VIC-20 maximum is 32,384; on the Commodore 64, up to 64,000 are possible. Some microcomputers let you use up to a quarter of a million blocks. With this many blocks on the screen, they look less like blocks and more like tiny dots.

Yet another way to create computer art is to use *turtle graphics*. Most personal computers, including the VIC and 64, can run the PILOT or Logo languages. In turtle graphics, a small, imaginary turtle (often the shape of a triangle) walks across the screen while leaving behind a trail. By issuing commands such as TURN 90 and FORWARD 10, shapes are drawn.

The turtle draws pictures by connecting two points on the screen with a straight line. The turtle can draw simple shapes such as squares or triangles. Or it can draw lots of little straight lines to make a circle. The turtle makes the circle by going forward one tiny space, then turning to the right one degree. Since it takes 360 degrees to make a circle, the turtle has to go forward and turn right 360 times.

The turtle doesn't have to stick to circles. It can make stars, snowflakes, even fierce dragons. It can make any number of complicated, beautiful



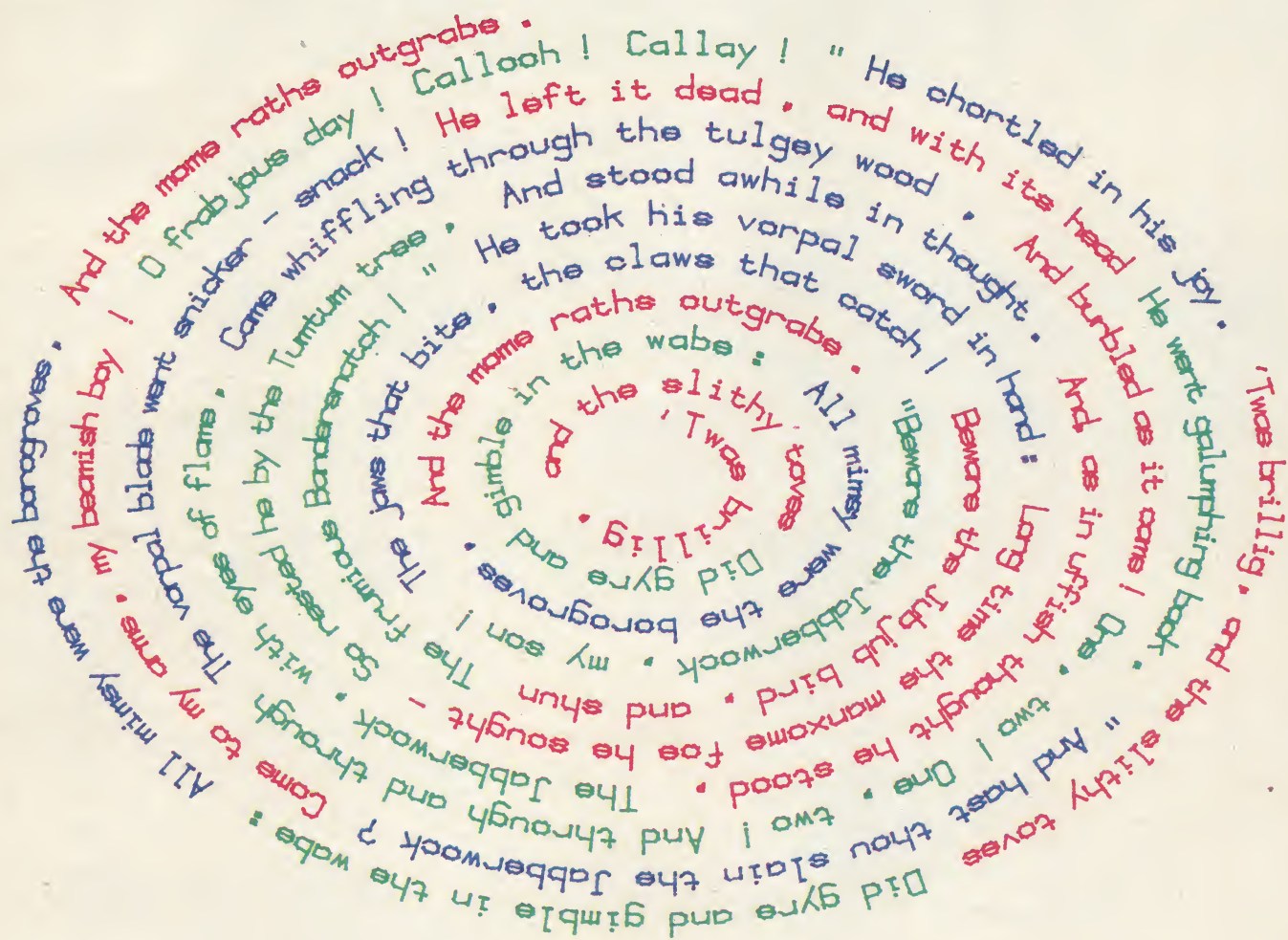
Simple shapes can be combined into beautiful, three-dimensional shapes with turtle graphics. (Courtesy of computer artist Joe Jacobson.)

shapes – all from tiny straight lines (see example printout).

The turtle usually draws with lines made up of dozens of blocks strung together. But its lines could be made up of special figures or letters of the alphabet (see printout).

Computer art will be more like drawing with a pen, pencil, or paintbrush.

One relatively new device is the *light pen*. The pen is wired to the computer. As you touch the tip of the pen to the screen and move it across the glass, it leaves an electronic "line." Some light



Jabberwocky

Figures can even be drawn with words. (Courtesy of computer artist Joe Jacobson. Reprinted from Creative Kid's Guide to Home Computers with permission of Doubleday & Company.)

Until recently, the only way to make computer graphics was to type commands on the computer keyboard. But that's not the way traditional artists draw. They use pencils, pens, and paintbrushes. They draw the picture directly on a piece of paper. They don't have to type a PAINT command on their paintbrush, or a SKETCH command on their pencil.

Now computers are being made to work with equipment and programs that will make it as easy to draw pictures on a video screen as on paper.

pens draw in different colors. Others let you touch the screen and fill in a whole picture with a particular color. With a single touch, you could paint the sky blue, clouds white, or a robot metallic orange (see photo).

Another device is the graphics tablet. The tablet is a flat plastic rectangle or square. You mount a picture you want to trace on top of the tablet. Above your picture is a plastic arm, often with a magnifying glass on the end.

You trace the picture by moving the tip of the



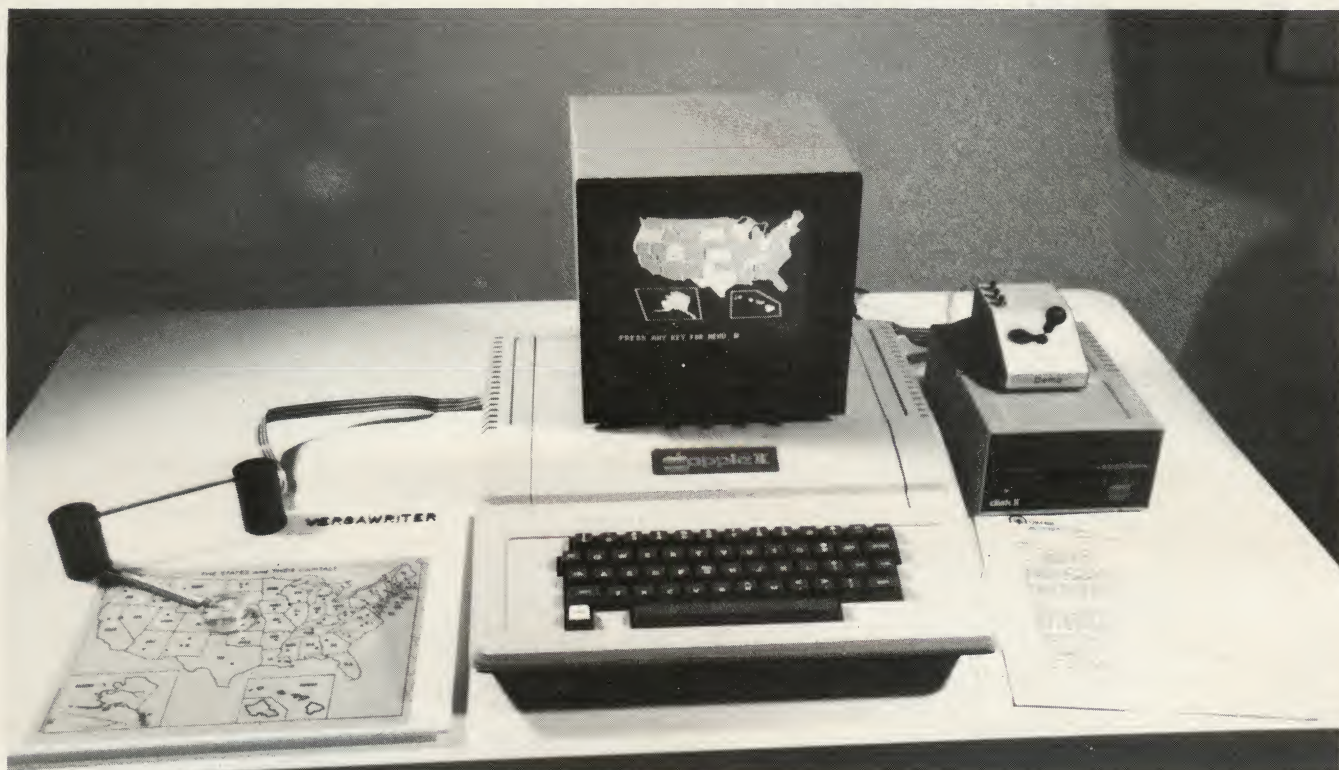
Drawing pictures directly on the TV screen with a light pen.
(Courtesy of Matsushita Electric.)

plastic arm above each line in the picture. The arm and the graphics tablet are wired to the computer. As you move the arm, it sends signals to the computer. These signals are an electronic copy of your picture, stored in the computer's memory. With just a couple of commands, you can get the computer to display the picture on the TV screen. It is fuzzier than the original, and the colors are different, but it is still very much like the picture you traced (see photo).

You can use a graphics tablet to make computer images of maps, photographs, shapes, drawings – almost anything. You also draw original pictures of your own on graphics tablets. An electronic copy is stored inside the computer and appears on the TV. On some computers, you can manipulate the picture once it is inside the computer: shrink it, expand it, change its colors, spin it around, or stretch it apart like Silly Putty (see picture made by duplicating birds).

Million-dollar mainframe computers are being used more and more to create graphics for things like flight simulators and Hollywood movies (such as last year's *TRON*). These computers are becoming so powerful that, sometimes, their pictures look like photographs of real people, real places, and real things.

Moviemakers and human artists are pro-



With a graphics tablet, you can copy maps, photographs, or diagrams into the computer by tracing them with the graphics arm wired to the computer. (Courtesy of Versawriter Inc.)



In this picture, a single pair of birds was copied into the computer. The computer duplicated the two birds dozens of times to make this beautiful pattern. (Courtesy of the PLATO Project. Copyright 1979, University of Illinois Board of Trustees.)

programming computers to create movie and TV scenes that would be too expensive or impossible to stage with live human actors. In days gone by, a team of human artists would paint these scenes (called *mattes*). Now humans program computers to paint the scenes. And the scenes aren't frozen, like a still photo. The computer brings the scenes to life. They become realistic computer cartoons.

Computers that draw scenes for movies are

far too expensive to become personal computers today. But scientists are inventing a new generation of special-purpose computer chips that will soon drastically reduce the cost of these computers. Million-dollar computers can now fit on a \$5000 graphics chip. Hopefully, one day soon, these chips will be inside personal computers. The result will be the birth of a new era in computer graphics and electronic art.

There's A Creature In My Computer!

The Lobsters Under My Bed

When I was a kid I used to go to sleep at night with my hands pulled up inside the sleeves of my pajamas, and my feet tucked inside two layers of socks and a pair of slippers. I did this to hide my fingers and toes from the lobsters that lived under my bed.

These lobsters weren't just average creatures. First, they didn't need to live in water. Instead, they could somehow survive under my bed — along with lint, dust, dirty clothes, copies of *Mad* magazine, science fiction books, and potato chip crumbs.

Second, if they got hungry, they didn't look for regular lobster food. Instead, they liked to munch on crumpled, smelly socks. (There were lots of those under my bed.) But their favorite food was fingers and toes — *dirty* fingers and *dirty* toes.

I went to bed at night convinced that lobsters really did live under my bed. I was afraid that if I fell asleep and accidentally let my hand or foot slip over the side of the bed, one of the lobsters would leap out, pinch it off, gobble it up, and disappear back under the bed.

The lobsters had never been known to attack clean fingers and clean toes. But I never considered taking a bath. Instead, I bundled up my toes and fingers, and slept in bed all scrunched up like a sunburnt spider. If a lobster wanted to make a meal out of me, it was going to have to work for it.

I shared my bedroom with several lobsters. But we weren't alone. There was also a nightmarish creature who lived underneath my



dresser. He would come out from under the dresser when my mother turned out the hall light. He always hid in the shadows. In fact, he *was* a shadow. Real slithery, dark, and tricky. He was all body. No head.

And then there was the creature that lived in my closet behind my dress shirts and Sunday school pants. I called him the Closet Beast. He was one of those shy creatures. He only came out at night when I wanted nothing to do with him. During the day he probably killed time pretending to look like a bow tie or the pair of brown dress shoes I hated.

Between me and all the creatures, the bedroom was crowded. I wished that some of the bedroom creatures would move out. But if they had they would have bumped into the creatures in the other parts of the house. The worst of these was the Ghoul who lived in the cellar, underneath the stairs.

I hoped and prayed I would never meet the cellar Ghoul. But one night I came very close. It all happened because I was a sleepwalker. I was so bad that my mother had to bolt all the win-

dows each night before she went to bed. She was afraid I might climb out one of them and try to sleepwalk on the two-foot ledge that rimmed the roof.

Thanks to my mother I never did any sleepwalking on the roof. But I did sleepwalk a lot inside the house. And I sometimes ended up in some pretty strange places.

One night I woke up and immediately knew something wasn't right. I had my pillow and was wrapped up in my blanket like a mummy, but I wasn't in my bedroom any longer. I was someplace else, someplace very, very dark. And damp. And moldy smelling.

I rubbed my fingers on something hard underneath me. I realized I wasn't in bed. I was on a dusty concrete floor — the basement floor. And I was right next to the stairs where the Ghoul lived.

As dark as the basement was, the space under the stairs was even darker. I couldn't see anything, but I could sense that I was not alone. Something was there with me. And it was coming closer.

I screamed. I screamed again. And again.

I woke up the whole house with my screaming. Moments later, the basement light came on. My parents came flying down the stairs and found me huddled under my blanket, wailing like a ninny.

When they dug my head out of the covers, I pointed toward the stairs. My parents investigated. They didn't catch the Ghoul. But, they did find, hiding under the stairs, a very scared kitty cat.

There's A Creature In My Computer!

I used to see creatures in every shadow or dark corner of my life. I saw so many creatures because I had a crazy imagination.

How about you? Do you have a crazy imagination like mine? Do you see ghosts in wisps of smoke? Do you see sleeping giants inside craggy mountains? Do you see fang-toothed monsters staring up at you out of gutters and hollow stumps of trees? Have you seen the skinny creature who lives inside your medicine cabinet — the one that feasts on stale toothpaste?

With a little imagination you can see creatures everywhere. And, with a little imagination, you can create a creature inside your computer. The creature (he, she, or *it*) might even be living there now. You just have to bring it to life.

The Ghosts In The Machine

Your computer is a perfect place for a creature to live. After all, it's already full of ghosts. The ghosts are other people's programs.

Some people think that programs are just abstract lists full of information and commands. These people are wrong. A program is — or can be — much, much more.

Every program that is written has a personality. Most computer programs written in the past had dull personalities. But they don't have to be dull.

Where does a program's personality come from? It comes from its creator, the person who thought it up and typed the commands into the computer.

The program is a reflection of its creator's imagination.

If the person has a dumpy, dull sort of imagination, then the program will be dull. It might have the personality of a stuffed shirt or toad. Most business programs have toady personalities.

On the other hand, if the person's imagination is creative, weird, and funny, then the program will be creative, weird, and funny, too. (Does this remind you of a few game programs



you have played?)

Programs are the ghosts inside your computer. So why not turn them into real ghosts, goblins, ogres, zombies, dragons, and other creatures? You can take the creatures that live inside your imagination and load them into your computer. To create the creatures you just write a program. To bring them to life you just type RUN.

Turn On Your Imagination

Warning: If your imagination is having a bad day, you'd better stop here and wait. The creature we're going to create this month is 99 percent imagination and only 1 percent program. The creature is simple, but it can still seem real — if you use your imagination.

A Simple Creature

Turn on your computer and type:

```
20 PRINT "GRRRR!!" [Press the RETURN key.]
```

You have just created a creature inside your computer. You don't know what it looks like. You don't know if it wears a ski cap and orange polka-dotted socks, or how many warts are on its nose. But you do know two things: it's there and it's not very friendly.

To see if I'm right, type RUN (and press RETURN). What does the creature do? It says:

GRRRR!!

Not too friendly, is it?

What happens if you add a new line to the creature's program? For example, type:

```
30 GOTO 20
```

Now type RUN. What happens? This time you see:

**GRRRR!!
GRRRR!!
GRRRR!!
GRRRR!!
GRRRR!!
GRRRR!!
GRRRR!!
GRRRR!!**

Now you've created a creature that is *really* unfriendly! (To stop the creature from growling, press the RUN/STOP key.)

So far, the only way to get your creature's attention is to type RUN. But you might want to say something to the creature. To do this you have to teach the creature to *listen*. To make it listen, type:

```
10 INPUT A$
```

Change line 30 to say GOTO 10. Your whole program now looks like this:

```
10 INPUT A$  
20 PRINT "GRRRR!!"  
30 GOTO 10
```

Type RUN.

The program begins running, and the creature wakes up. He is looking at you. He is waiting for you to say something. (The computer has printed a "?" on the display screen. Imagine that the creature is sprawled in a dungeon inside the computer. He is just waking up. He looks dazed, and has a big "?" over his head.)

This is your first chance to say something to the creature. In fact, he won't make a move until you say something.

But what do you say to a creature?

You can try insulting him by saying something like:

YOUR FEET SMELL!

Or you might try giving him a command like:
DON'T EAT ME!

Or, you can try to be friendly and ask the creature a question, such as:

DO YOU LIKE PIZZA?

Think up a message, type the message, then type RETURN. What is the creature's answer? He says:

GRRRR!!

He says "GRRRR!!" because it's the only thing he knows how to say. He's a very dumb creature. No matter what you tell him, he always growls. He's a real grump.

To make him say something else, you have to teach him. What sort of new things can you teach your creature to say? What sort of things can you teach your creature to do?

Next Time: New Creatures

This time we created a very simple creature. Next time we'll see how we can create a creature that surprises you. He'll make scary creature sounds. And he'll have a creature face.

I'll help you build creatures and turn them loose on other members of your family. But I'd really like to see what creature you can come up with on your own.

Write a short program and make a creature. Then, no matter how crazy the creature is, send it to me. Send it to:

*Fred D'Ignazio
2117 Carter Road, SW
Roanoke, VA 24015*

Dream up strange, funny, and unusual creatures, then turn them into programs and send them to me. I'll print the best programs in this column.

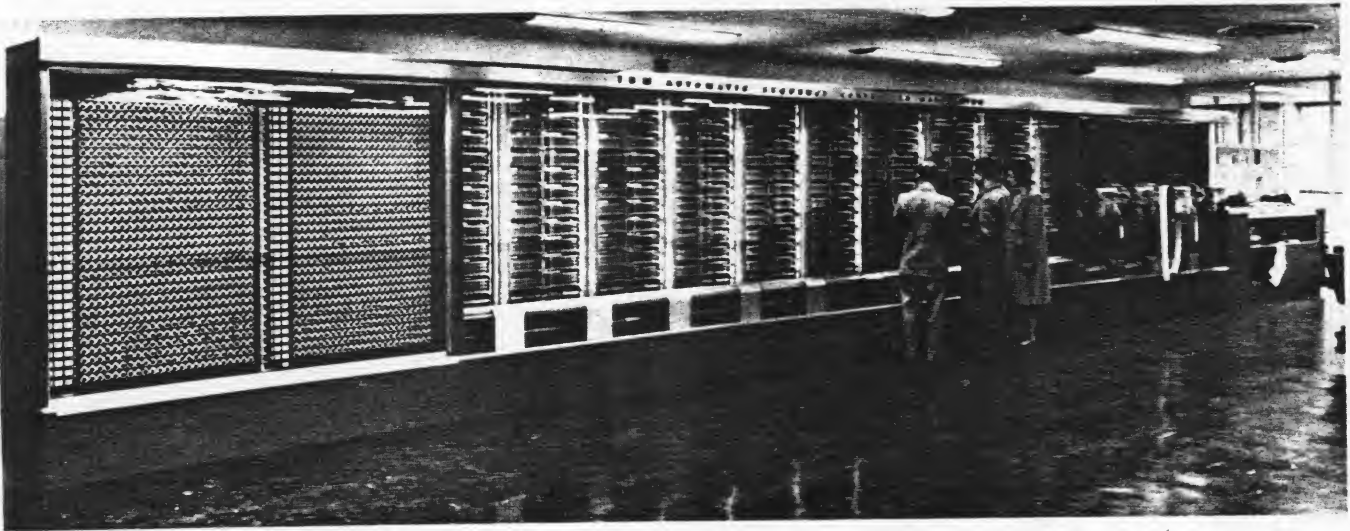
Be like a magician pulling rabbits out of a hat. Pull the creatures out of your imagination. Then pop them in the computer and bring them to life.

You can send me any kind of creature at all.

Except for just one kind.

Don't send any lobsters. ☹

for kids



A "dinosaur" computer of the 1940s. When the IBM Mark I began working in 1944, it sounded like a roomful of knitters using metal needles. It went "clickety-clickety-clickety."

Courtesy of IBM.

From Dinosaurs To Freckles

Have you ever seen a dinosaur spit out numbers?

Forty years ago, dinosaurs inhabited Earth, just like in prehistoric times. The dinosaurs were enormous. Some were the size of your living room. Others were even bigger. They filled warehouses, laboratories, and entire city blocks. And when they were well fed, they spit out numbers.

The dinosaurs had metal skin. Inside their bodies were millions of wires, some the size of jungle pythons. The dinosaurs were controlled by thousands of hot, glowing vacuum tubes the size of big dill pickles. The vacuum tubes acted like traffic cops and routed the flow of electricity through the dinosaurs' wires.

The dinosaurs spit out numbers. They also ate them. The dinosaurs liked only two kinds of numbers: ones and zeros. Dozens of human beings fed them ones and zeros in long, caterpillar-like strings.

The humans hoped that after the dinosaurs

finished eating, they would say something wise. They hoped the dinosaurs would solve their problems. But the dinosaurs were slow. After weeks of eating bucket loads of numbers, the dinosaurs finally answered. Unfortunately, they were often wrong.

In some ways, these recent dinosaurs were unlike their ancestors. For example, the old prehistoric dinosaurs were mostly brawn. They had tiny brains, the size of a pea or a walnut. Like the old dinosaurs, the new dinosaurs were big. But their bigness was all brain.

The new dinosaurs were different in another way, too. The first dinosaurs were living creatures. They were *reptiles*. Their descendants include alligators, crocodiles, snakes, and lizards. These creatures are alive today.

But the new dinosaurs were not alive. They weren't even creatures at all. They were machines. They were the world's first *computers*!

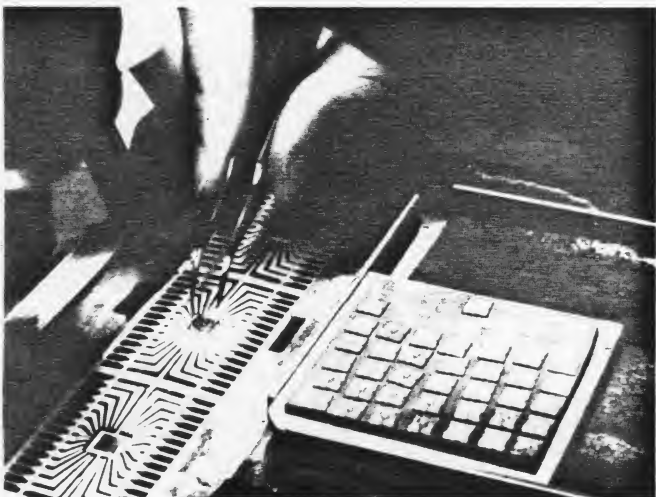


Engineer Mike Grieco at Bell Labs holds a wafer with 64 tiny chips. Behind him you can see a TV picture of the transistors on just one chip magnified 400 times.

Courtesy of Bell Laboratories.

The computers were almost as rare as dinosaurs. For several years after they were invented, there were only half a dozen computers scattered across the whole world. And, though they were big, they were sensitive and fussy creatures. Every time you turned them on, one or two of their vacuum tubes would explode from the surge of electrical power. Then it sometimes took people several days to find the bad tubes among the thousands of good ones.

Almost as soon as computers were invented, scientists, business people, and military generals realized that computers, one day, could become important machines. Computers could help people conduct experiments, solve mathematical problems, process a company's records, and guide missiles, satellites, and spaceships. But, some-



"Brain" chips are lined up like soldiers on parade. A human factory worker uses tweezers to pick up the chips and place them in a protective metal package. The packages resemble spiders with 28 gold legs, so they are known as "bugs."

Courtesy of Texas Instruments Inc.

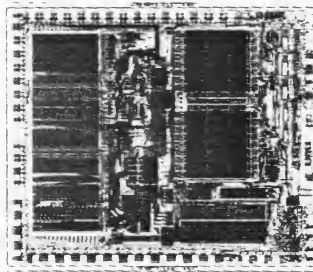
how, they had to become smaller, faster, cheaper, and more reliable.

No More Tubes

Then a breakthrough occurred. Two days before Christmas in 1947, scientists at Bell Laboratories in New Jersey invented the *transistor*. Transistors could function just like a computer's vacuum tubes. They could act like "magnifying glasses" and create a big electrical charge from a small charge. They could act like "traffic cops" and route charges through a computer's thousands of wires. And they could act like "light switches" and turn charges on and off.

Transistors could do everything vacuum tubes could do. They were also cheaper, smaller, faster, and more reliable.

The first transistors, used in computers in the late 1950s, were about the size of paper clips or small Tootsie Rolls. This was small, but it wasn't small enough. Scientists kept searching for new ways to make the transistors even smaller.



This is what a chip would look like under a microscope. Its thousands of tiny transistors and pathways resemble buildings and streets in a large city.

Courtesy of Motorola Inc.

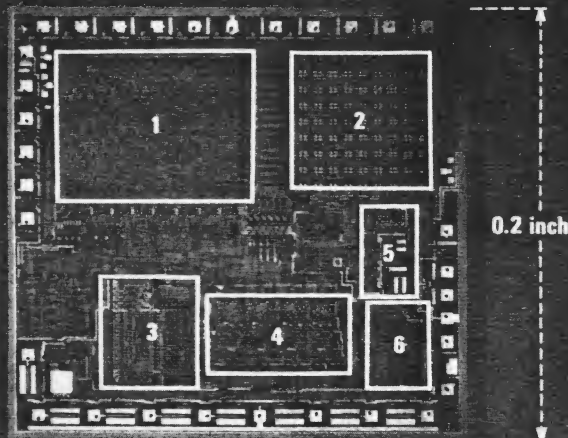
In the early 1960s, scientists invented the *integrated circuit* (or IC). The integrated circuit could squeeze up to a hundred transistors onto a round surface the size of a small sugar cookie.

To make an IC, scientists grew a large *silicon crystal* in their laboratory. Silicon is an element – one of the basic building blocks of the universe, like oxygen, mercury, and iron. When you go to the beach, you see silicon everywhere, mixed in with the sand. It is the silicon that sparkles up at you when you run across the beach on a sunny day.

The silicon crystals in the scientists' labs resembled long, fat Italian sausages. The scientists sliced the crystals into thin wafers using an extremely sharp buzz saw. They took a photograph of lots of transistors' wires, then reduced (or shrank) the photograph until it was the size of one of the wafers. They placed the photograph on top of the wafer and dropped the wafer in a strong chemical bath. The chemical dug tiny "trenches" across the surface of the wafer. The trenches followed the wires in the photograph. When the chemical evaporated, the trenches were filled with metal. They had become transistors and incredibly tiny pathways for electricity.

MOS MICROCOMPUTER

- 1 READ ONLY MEMORY
- 2 RANDOM ACCESS MEMORY
- 3 CONTROL DECODE
- 4 ARITHMETIC LOGIC UNIT
- 5 CLOCK
- 6 INPUT/OUTPUT DECODE



An average chip is only .2 inches (1/5 of an inch) on a side. Yet it is made up of several complicated parts including a part that does arithmetic (#4 – Arithmetic Logic Unit), a “clock” (#5), a “brain” (#3, #4, #5, and #6 working together), and two kinds of memory (#1 and #2).

Courtesy of Texas Instruments Inc.

The scientists cut the round silicon wafer into little squares the size of a bread crumb. Each little square was called a *chip*. On its surface were dozens of transistors. The transistors criss-crossed the chip’s surface, like a maze of tiny roads.

Computers On A Chip

During the 1960s and 1970s, scientists found ways to pack more and more transistors onto a single chip. Today, in the mid-1980s, scientists are able to build a chip with more than a *million* transistors.

The first chips were primitive. With only a couple of transistors, all they could do was turn lights off and on, or remember a couple of numbers, like 5 and 14.

Today’s chips are completely different. They can do almost anything! A single chip can act as a computer “brain” and add a million numbers in only one second. It can act as a computer “memory” and remember a hundred thousand kids’ birthdays. It can tell the time, control a car, guide a robot, or act as your opponent in an electronic game.

An entire computer can fit on a single chip. But chip-sized computers are too small and delicate for us to carry around in our pockets. To use them, we must connect them to something larger. We can wear them on our wrists inside digital watches. Or we can hide them inside dishwashers, arcade games, and microwave ovens. Or, if we

connect them to typewriters, TV screens, and tape recorders, they become *personal computers*!

Kids use personal computers to draw pictures, make music, do their schoolwork, and play games. Personal computers fit on top of a kitchen table.

Personal computers are small and easy to use. They use less power than a simple light bulb. Yet they are a million times more powerful than the dinosaur-sized computers of forty years ago.

The early computers weighed more than a basketball team of elephants. They were powered by up to 20,000 vacuum tubes and cost millions of dollars.

A personal computer might weigh less than five pounds. It might cost less than \$100. And its “brain” is a chip the size of a freckle.



Chips are so small they could hide under your tongue, behind your ear, in your sock, or ride on the back of a ladybug.

Courtesy of Intel. ●

COMPUTING for grownups

FRED D'IGNAZIO,
ASSOCIATE EDITOR

Giants And Dwarfs

This installment of "Computing For Grownups," a bi-monthly column, looks at the different ways adults and children perceive computers. We also look at one family's approach to word processing.

Yesterday my seven-year-old daughter Catie went off to computer camp at Hollins College, here in Roanoke, Virginia. When she came home she could hardly wait to tell me about her day. "Computer camp was fun!" she exclaimed. "I thought we'd have to program all day, but we didn't. We did *lots* of things!"

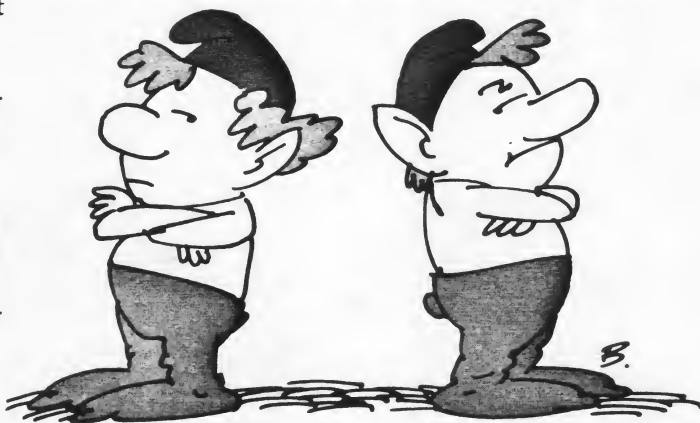
One thing Catie did was send electronic mail back and forth to her campmate, Ashley Bell. The girls used the Minerva terminals on Hollins College's DEC (Digital Equipment Corporation) computer system.

Using a *big* computer was a new experience for Catie. The only kind of computers she has ever seen are personal computers. Until yesterday she didn't even know what a big computer was. She thought it was really neat that she and her campmates were all using a computer – the same computer! She has grown up in a world of truly personal computing; *group* computing was a new experience for her. And she loved it.

For example, last night she wanted us to wire all our little computers together. Catie wanted to send games and electronic mail from her bedroom to her brother Eric's bedroom, and from the kids' bedrooms to my study, to the kitchen, the basement (kid's playroom), and even to the bathroom

("In case I want to tell you something while I'm taking a bath," Catie said).

I had to explain to Catie that the computers she was using at computer camp were really just terminals – "octopus arms" to a single giant computer. The computers in our house, I said, were different. They were like little dwarf computers –



dwarfs of every sort, color, and personality. The dwarfs were all different from each other. Most were not even on speaking terms. Getting them to talk to each other was not "just a quick project" as Catie called it.

Different Perceptions

All this talk about giants and dwarfs got me thinking. When it comes to computers, Catie and Eric's generation sees things just the opposite of my generation (adults in their 20s and 30s, and above). When I close my eyes and try to picture

computers, I still see the big IBMs, Univacs, Honeywells, Burroughs, and other machines. When Catie closes her eyes, she sees VICs, Commodore 64s, Apples, Ataris, and small lap computers such as the Epson HX-20 and TI's CC-40.

Now that small computers are popping up everywhere in millions of people's homes, classrooms, and offices, we adults are beginning to change our impressions. More and more, we acknowledge that there are two kinds of computers—giants and dwarfs.

But kids still see only one kind of computer. And that's all they'll ever see, until they grow up and try to get a job. Then, *BOOM!*, they'll come face to face with their first computer giant. And they'll be ill-prepared for that experience.

As far as most kids know, the Computer Age began in 1977 and 1978 with the appearance of the first Apples, Commodore PETs, and Radio Shack TRS-80s. The memories of younger kids don't go back even that far.

For most kids the giant computers have disappeared. Or, they never existed. Giant computers are creatures from adult fairy tales that filter home from the office or workplace. Little kids see them occasionally on TV or in the movies because they are stereotypes. But they are vague, hazy creatures. Based on movies like *Superman III* and *War Games*, kids' images of big computers are certain to be extremely stilted and unrealistic.

Giant computers are not a tangible part of a child's everyday world. But they have not disappeared. They have faded from the popular consciousness because they are not as trendy, fun, or cheap as the little personal computers. And they are not poking their terminals into all of our homes.

Giant computers are not mass-media superstars. But they still run the world. Personal computers are the front men for the computer revolution, but the big mainframe computers are still there, locked in the back room, chugging away, churning out most of the world's work.

An Emerging Network

Pretty soon, mainframe computers will play a larger part in the life of our families. When we dial up an information network such as CompuServe or The Source, we are linking our personal computer with a mainframe computer. Information networks, libraries, mail systems, banks, and shopping catalogs will soon become a major adjunct to "personal computing."

In the next couple of years, small computers will cease to be little isolated atoms in the electronic universe. Instead they will become *nodes* linked in neighborhood, professional, and national networks. Personal computers are now autistic, shut off from each other. This is no way to gather in-

formation, learn new things, and get work done. Personal computers must communicate. And the big computers will act as the middlemen.

What's more, big computers have advanced computational abilities still sadly lacking in most smaller computers. As part of their computer education, our kids (even our smallest kids) should learn about these powerful machines.

Computer camps at universities are great places to learn more about large computers. Another place is Walt Disney's EPCOT Center (Experimental Prototype Community of Tomorrow), in northern Florida, near Disney World. When I found out that EPCOT did not feature personal computers in a "community of the future," I called to ask why. An EPCOT official explained that the designers of EPCOT had studied small computers, but they had decided that small computers were still not friendly enough. "Big computers can be much friendlier than small computers," she said. "Our big computers at EPCOT are fast, have gigantic memories to store millions of facts, and are capable of displaying beautiful, high-resolution pictures."

As I listened to her talk, I remembered the big computers I had grown up with. Maybe they were big and fast and were magicians with pictures, but they were also cold, unfriendly, and aloof. As a college student, the closest I ever came to an IBM 370 was when I pressed my nose up against the heavy-duty glass surrounding the computer room. I told this to the EPCOT woman.

She explained that their big computers were hidden away, but their terminals (like the octopus arms of the computer at Catie's computer camp) were all over EPCOT for everyone to use. "And we don't put up a barrier between people and our computers by making people use a keyboard," she said. "People can interact with our computers by operating simple controls, by touching the picture screens, and by talking to them. And the computers talk back."

Family Word Processing

I make my living by writing. I prefer to use *WordStar* on a personal computer to write faster and better. This has made me the default champion of "family word processing" here in our home in Roanoke.

I may be family champion for now, but there are several challengers on the horizon.

First, there is my wife Janet. Janet doesn't like *WordStar*. "It's too complicated," she says. "Using *WordStar*, you don't write a letter, you program it!"

Janet isn't an ex-computer programmer like me. Instead of running programs, she runs buses. And when she sits down to type a letter, she doesn't want to program. She does not want to

go through an elaborate regimen of switch-flipping and button-pushing, as if she were Sally Ride preparing for blast-off on the space shuttle *Challenger*. She just wants to type a letter.

So Janet has abandoned *WordStar* in favor of another word processing program, *Text Wizard*. And now she's turning out whole piles of papers, résumés, and correspondence.

Then there's Catie. Catie does her word processing lying in bed.

Catie's computer is right beside her bed on a card table. Catie has a perfectly good chair to sit in, but she has swiveled her computer around to face the bed, and she types lying down, with her fat black cat draped across her back.

Catie has a simple explanation for the unusual way she has arranged her word processing workstation. "Mowie [the cat] wouldn't fit on the chair," she says.

Catie doesn't use *Text Wizard* or *WordStar*. Her favorite is *Bank Street Writer*. She cranks out page after page of very short stories, and notes to her parents, Eric, and Mowie. According to Catie, *Bank Street Writer* is the preferred word processor for seven-year-old girls, "because it's easy to fill up the little box on the screen, and it makes pretty letters."

(Although *WordStar*, *Text Wizard*, and *Bank Street Writer* will not run on a VIC or 64, many other word processors of similar quality are available. See "A Survey Of Inexpensive Word Processors For VIC And 64" in this issue.)

Gobbledygook Processing

Is that it? Are there any other family members who are challenging me for my position as the family's number-one word processor?

There couldn't be any body else, really. There's Eric and Mowie, but neither of them can read or write.

Mowie is truly out of the running. She's content to lazily nap on Catie's back. But Eric is another story.

Every morning before nursery school and every night right at his bedtime, I find him in the study pounding away on a computer. I'm not certain what Eric is typing, but the paper flies! As far as I can tell, Eric may not even be competing with the other members of the family. He may have created his own category - *gobbledygook processing*.

Eric's workstation is even more unusual than Catie's. He achieves maximum productivity when he is standing on the creaky wooden chair in my study and leaning over the computer. He usually does his typing in his bare feet, and this morning, in his underwear, too. (The increased ventilation probably keeps the ideas flowing).

I left him alone this morning for about 15 minutes. When I came back, he had a streamer of printer paper about six feet long sticking out of the computer. "Look at this, Daddy!" he exclaimed proudly. "Look at all the work I did!"

Eric doesn't have his own briefcase yet. So when he went off to school this morning, he had his work rolled up, fastened with a green rubber band, and dangling inside a plastic bag.

As soon as he got to his class, he was besieged by other kids asking to see the bag's mysterious contents. He pulled out the paper, unrolled it, and carefully explained how he made all the hundreds of random letters, numbers, punctuation symbols, and graphic characters that he and the computer processed.

The kids were impressed. They'll probably go home and tell their families. And, who knows, with Eric around, advanced gobbledygook processing might become very popular in Roanoke. Soon all the preschoolers could be doing it. ●



COMPUTING for families

A Visit With Sweetums The Ogre

Fred D'Ignazio, Associate Editor

I had the thrill of my life last week.

I'm the "children and computers" commentator and product reviewer for The NewTech Times TV show (each week this fall and next spring on PBS), and I got to visit Jim Henson's Muppet Mansion in New York City to review the *Muppet Learning Keys*, a new computer keyboard for children from Henson Associates, Sunburst Communications, and Koala Technologies.

When I stood outside on the street, the Muppet Mansion looked to me like any other posh dwelling on Manhattan's upper East Side. But when I walked through the front door, I left the city behind and entered the world of Jim Henson's imagination.

The mansion's foyer is dominated by a three-story-high muppet balloon—rather, balloons on top of balloons on top of balloons stretching up to the distant ceiling. Tiny muppets cling to the balloons and float around them on all sides.

The muppet puppeteer's room is around the corner, behind the stairs, and there I saw a drawer full of Kermit heads and Gonzo perched lazily atop a bookshelf.

I left the balloons, the puppeteers, and the Kermit heads behind and climbed the stairs. Sweetums the Ogre was waiting for me on the second floor. Sweetums is a tall (very tall) ogre whose film career dates back to a monster "extra" part he played in Kermit the Frog's movie debut, *The Frog Prince*, in 1971.

Sweetums is not the sort of creature I'd like to bump into on a dark night. He's big, hairy, and all mouth. And he doesn't walk, he gallops. When he saw me, he galloped across the floor and gave me a friendly, bone-stretching ogre hug. I felt like I'd been swallowed by a furry rug.

Sweetums volunteered to be my child tester



© Henson Associates, Inc. 1984

and help me review the *Muppet Learning Keys*. I've worked with lots of children, but I've never worked with an ogre before, so there were a few things we had to get straight. First, I had to tell Sweetums not to eat the floppy disk that comes with the keyboard (he got the disk stuck on his snaggle tooth). Second, we had a very undignified tug-o'-war when we first got the keyboard. Sweetums wanted to play with the keyboard first, and when I told him I needed the keyboard, he turned his back to me and pouted. Third, Sweetums does not speak English. He only speaks "ogre." So I had to learn what things like "Grrrr . . . Mmmmm . . . Hrrumph . . . Um-Be-Dum-Be-Dum-Be-Dum-Be-Dum" meant. I paid attention (it's hard not to pay attention to Sweetums), so I eventually caught on.



My favorite part of the review was when Sweetums picked up the Commodore 64 keyboard and tried to press the keys. His big, furry monster fingers squashed six or seven keys at a time. So now I know. If you have an ogre in your family, a Commodore 64 keyboard is not adequate.

But you might look into the new *Muppet Learning Keys*. Sweetums' fingers worked fine on the big, widely spaced keys. And so did my adult fingers, too. When I played with the keyboard I learned how nice it was to have big keys in bright colors. My fingers were tired of cramped computer keyboards. The keys are arranged in alphabetical order, so they are not suited for touch typists. But they are great for the one-

fingered typists of the world, kids or adults.

There were two things about the keyboard I liked in particular. First, it was like a non-computer person's version of the Macintosh "desktop" environment. The Macintosh, as you probably know, has a display screen that shows little icons, or pictures, that are supposed to resemble items found on a person's desk at his or her office, including a wastebasket, file folders, an alarm clock, and so on. This "desktop" metaphor is all right for someone in an office, but it's not very exciting for little kids and for people who don't get that turned on by desks. And, besides, it's not really a desk, it's a picture screen. And the pictures are black and white and so tiny you have to squint to see them.

The "Anywhere" Desk

The *Muppet Learning Keys* also pretend to be a desktop. They plug into the Commodore 64 keyboard in joystick port 1. The keyboard is 14 by 15 inches, and about an inch high. You can prop the keyboard in your lap, or better yet, you can dive to the floor, and set up your "desk" there.

On top of your desk is a ruler, marked in inches, with big numbers, from 0 to 9. The numbers are really the number keys on the keyboard—rounded bumps on a flat, membrane keyboard.

Beneath the ruler is a paintbox with lots of watercolors, including yellow, orange, blue, red, and violet. Each color has a label beneath it. To select a color, you just stick your finger in the appropriate paint dish.

A little green chalkboard sits beneath the paintbox. Written in white chalk are the letters of the alphabet, in capital letters, and in alphabetical order. Underneath the chalkboard is one of those marbly assignment books with a Space key (it looks like outer space, with a comet and stars), and round arithmetic keys: plus, minus, multiplication, and division.

On the right side of your desk is a button that looks like you could pick it up and pin it on your shirt. It says "Zap" and you use it to escape from an activity and go back to a menu.

Beneath the Zap key is an eraser, so you can back up and erase mistakes. Next to the eraser is a compass. It's like a real compass that tells you North, South, East, and West, with arrow keys pointing up, down, to the right and left. It's an official Frog Scout Compass. You know that for sure because there's a famous green frog's face in the center of the compass.

In the lower righthand corner of the desk is a comic book. It's opened to the middle (you can see the staples). There are four cartoons showing.

There is a picture of Super Gonzo being launched by a cannon toward a brick wall shouting, "Oops!" When you press this picture, you can undo a mistake you've made.

There's a picture of Miss Piggy tied up on the railroad track crying, "Help!" If you use computers regularly, it's not hard to figure out what this key is for.

A cartoon of Fozzie Bear with a police cap and STOP sign and a picture of Kermit on a motorcycle underneath a green traffic light that says GO disguise keys that enable you to start and stop activities and animate pictures on the screen.

To make your desk work, you need software. And now we've come to the *Muppet Learning Keys*' chief drawback. For \$80, the keys come with a "Muppet Discovery Disk" created by Sunburst Communications. But that's it for now. According to Koala, many more disks are on the way, as well as overlays that fit on top of the keyboard so you can use it for different activities with different aged children. But no more software now is a real limitation, since the *Muppet Learning Keys* are a real keyboard, and it would be great if children and adults could use it as an alternative to the standard keyboard. But to do that, they need software.

The software that comes with the keys is limited, but it's also good. And this brings me to the second reason why I like the keyboard: It has succeeded in turning the computer into an electronic playground. I've claimed in many of my columns in the GAZETTE that my children (ages 8 and 5) spend most of their time on our Commodore 64 just banging on the keyboard and not using any software whatsoever. They know the computer far better than I do, just by experimenting with the different keys and looking at the display screen to see what pops up. This is "discovery learning" at its best, and it's also what you get with the *Muppet Learning Keys*.

To find out more about the *Muppet Learning Keys*, contact:

Koala Technologies
3100 Patrick Henry Drive
Santa Clara, CA 95052-8100
(408) 986-8866

When you call Koala, tell them Sweetums and Fred sent you. And tell them to get busy making new software!

The Computer Book Shelf

When I'm not in faraway places playing with ogres, I'm back in my house in Roanoke, Virginia, writing—and reading. Here are some of the books I've looked at recently that I recommend to families.

Scholastic Books has a new series of four computer activity books which are popular with me and my eight-year-old daughter. Each book costs only \$4.95 and contains dozens of programs that kids will like to enter into their Commodore 64.

The books are all written by Paul Somerson and Stephen Manes and are titled *Computer Space Adventures*, *Computer Crazyness*, *Computer Olympics*, and, my favorite, *Computer Monsters*.

The books don't start with a boring table of contents. Instead they begin with messages like "Greetings, Earthling!" or "Welcome, Human!" Then they tell kids the basics they'll need to know to enter a program on the computer. And they start showing kids programs, sample output, and weave it all into scenarios starring silly creatures, secret space missions, nutty numbers, and magic codes—a delightful smorgasbord for your 8- to 12-year-old.

When you get tired of monsters and rocket ships, you can come back to earth and try 1, 2, 3, *My Computer & Me!* by Jim Muller (Reston, 1984, 96 pages, paper, \$12.95). Muller is the Honorary Turtle and co-founder of the Young Peoples' Logo Association (P.O. Box 855067, Richardson, TX 75085—or call the Midnight Turtle bulletin board on your computer by dialing 214-783-7548).

1, 2, 3, *My Computer & Me!* is a workbook that children (ages 5 and up) can do with their parents. The book is an introduction to Logo thinking, programming, and playing. There are lots of exercises and experiments to do, and lots of blank space in the book for children to draw their own pictures, take notes, color, and just doodle. If you and your children are just beginning to use computers, I recommend this book as a very gentle introduction.

If your children are even younger and your wallet is flatter, you might want to look at *COMPUTERS!* (Golden Book, 1984, 32 pages, paper). This book, at only \$1.95, has to be the least expensive computer book on the market, and one of the best buys.

As with Muller's book, the emphasis in this book is on parents and children working at home together. The book is suitable for children ages five and up, and has two pages of stickers, games, experiments, and lots of other activities that parents and children can do with or without a computer. So get your pencils, glue, scissors, and crayons, Mom and Dad, and begin computing!

After you've been down in the trenches with your kids for heavy-duty glue-and-sticker computing, you may want a change of pace—food for thought instead of something gooey to stick to your fingers. In this case, you might look at *Buy A School For Your Home* by Judy Lower with Ed Neil and Tim Finger (Reston, 1984, 265

pages, paper, appendices, bibliography, \$14.95) or *Bank Street's Family Computer Book* by Barbara Brenner with Mari Endreweit (Ballantine, 1984, 251 pages, appendices, bibliography, indexes, paper, \$8.95).

Both books are intended for families who are just beginning. They answer your basic questions—for example, “Why should we buy a home computer?” And they give you plenty of information about how to buy a computer, how to shop for software, and most important, how to use the computer and software once you’ve got them home.

Buy A School has separate chapters on using computers with different aged children, and carries with it a strong emphasis on families using computers together and using computers as a learning tool. It also contains a 110-page section reviewing some of the better family programs.

Family Computer Book is rich with case histories about real families who have begun computing, based on the extensive experiences of the researchers at Bank Street College's Center for Children and Technology. It guides parents through the ins and outs of computer jargon and offers specific tips on how to select the right computer equipment and software for the family.

Both books are especially helpful, however, because they don't just keep to the specifics—the logistics—of family computing. They also have the insight and sensitivity to explore the bigger issues parents face when they invest in a computer for their family.

For those families who are past glue-and-crayons computing, and have already mastered the fundamentals, I recommend Eugene Galanter's *Kids & Computers: Advanced Programming Handbook* (Putnam/Perigee Books, 1984, 224 pages, appendices, index, paper, \$8.95). This is the third in the series of *Kids & Computers* books by Galanter and is intended for the older child, age 12 and up, who is already programming. I liked the book because it reminded me of a junior version of my computer science courses back at the University of North Carolina. This book is a home-study course in computer science for a student to take to supplement a course he or she is taking in school, or to read alone to pick up some new programming tricks and techniques like structured programming, using files and data structures, and creating basic sorting and searching algorithms. The book is thorough, but I offer one warning: It reads like a textbook. It's for the child who is already motivated, and not for the hesitant beginner.

Catalog Time!

Each month I get a bushel basket full of new computer catalogs brimming with new software

suitable for the family. I recommend that you take a look at several of these catalogs because they give you the chance to comparison shop for different kinds of software right in your own home.

Here are the best catalogs I've received:

Special Learning Ed Software (SLED)
(specializing in spelling programs)

P.O. Box 16322

Minneapolis, MN 55416

(612) 926-5820

Selected Microcomputer Software/Elementary Opportunities for Learning, Inc.

8950 Lurline Avenue

Dept. 2P

Chatsworth, CA 91311

(818) 341-2535

Quality Educational Microcomputer Software
Charles Clark Co., Inc.

168 Express Drive

South Brentwood, NY 11717

(516) 231-1220

The Children's Software Catalog
Evanston Educators, Inc.

1718 Sherman Avenue

Evanston, IL 60201

(312) 475-2556

Sunburst Educational Computer Courseware
(preschool to adult)

Sunburst Communications

Room BC39

Washington Avenue

Pleasantville, NY 10570

(800) 431-1934

Microcomputer Educational Programs MCE, Inc.
157 South Kalamazoo Mall

Kalamazoo, MI 49007

(800) 421-4157

(in Michigan, 616-345-8681, collect)

Scholastic Microcomputer Instructional Materials
(grades K-12)

Scholastic, Inc.

P.O. Box 7503

2931 E. McCarty Street

Jefferson City, MO 65102

(800) 325-6149

(in Missouri, 800-392-2179)

1984 Instructional Materials Catalog
DLM Teaching Resources

P.O. Box 4000

One DLM Park

Allen, TX 75002

(800) 527-4747

(in Texas, 800-442-4711)

Time Saver II

(preschool to adult educational software)

The Micro Center

P.O. Box 6

Pleasantville, NY 10570

(800) 431-2434 or (914) 769-6002

COMPUTING for families

The Computer Piano Teacher

Fred D'Ignazio, Associate Editor

When I was a kid, I asked my parents for piano lessons on my eighth birthday. It was one of the biggest mistakes of my life.

The piano lessons completely changed my attitude about the piano. Before the lessons began, I had banged on the family piano every day. But, after my lessons began, I played less and less often, until, by my ninth birthday, I only played two days a week: the day before my lesson and the day of my lesson. All the other days I stayed as far away from the piano as I could.

Playing For The Teacher

Why the big change? Before I started taking lessons, I was playing the piano for myself. After my lessons began, I was playing for the teacher. I played what she wanted me to play, how she wanted me to play, and when she wanted me to play it. I was on her schedule, not mine, and I resented it terribly.

But since I couldn't articulate my resentment at the time, I took the easy way out and became perverse. I "forgot" to practice. I "forgot" to show up on time for my lessons. I "forgot" my sheet music. I suffered through endless ailments that affected my fingers and hands. I complained of blurry vision, pains in my lower back, and even spent one summer trying to sneeze my way through every lesson.

I must have been pure torture for the endless stream of kindly women who had the misfortune of becoming my piano teacher. They would lecture me, harangue me, plead with me, and beg me to practice, but I never did. And instead I wasted their time and my time for six long years before my parents finally gave up and discontinued my lessons.

I was 14 when I stopped taking piano lessons, and in the 22 years since I stopped taking lessons, I've probably only sat down at the piano ten times.

Catie's Turn

Now my nine-year-old daughter Catie is in-

terested in the piano, and she wants my wife and me to let her start taking lessons.

How can I explain to Catie that piano lessons killed my interest in the piano and smothered whatever ability I had to become a decent musician? How can I tell her how angry I am at myself, my parents, and all those poor innocent piano teachers? All I know is that when I see that Catie is interested in the piano, I am very, very wary.

1001 Ways To Play "Heart And Soul"

What makes it worse is that Catie is just like I used to be (before the lessons): She is a piano addict. She comes in from school every afternoon and heads straight for the piano. When she walks by the piano room door, she always slips into the room and plays a few bars of her favorite song, "Heart And Soul." In fact, she plays the song incessantly. We hear it early in the morning, late at night, and all day long on weekends.

Catie doesn't play the song mechanically. Instead, she has become a "Heart & Soul" virtuoso. She plays it fast. She plays it slow. She plays it several octaves too high. She plays it several octaves too low. She reverses the chords. She adds new chords. She plays it (at last count) 23 different ways. And she adds a new variation every other day.

My wife Janet and I have heard "Heart And Soul" so many times, in so many ways, that we are climbing the walls. When Catie slips into the piano room and begins banging away, my wife and I sprint from the kitchen or study and slam the door shut. We are desperate parents.

Catie is driving both of us crazy. Yet we are very proud of her. We submit to this daily torture willingly because we value Catie's interest in the piano and her originality and experimentation.

We may soon invest in a couple pairs of extra-thick ear muffs, but we will not tell Catie how to practice, when to practice, or what to

practice. We've made it clear to her that the piano is her project, and what she does on the piano is her business.

Interviewing Piano Teachers

We have thought about getting Catie a piano teacher. About two months ago, I interviewed five piano teachers, and finally gave up. All of them looked and sounded like my old piano teachers. They wanted Catie to play the same kinds of introductory pieces. They emphasized sight-reading and other mechanical skills in place of musical enjoyment, creativity, and originality. They didn't seem the least bit interested in Catie's interest in arranging and composing music. And they had no plans to teach Catie about the wider cultural and historical dimensions of music. Instead, the lessons would consist of 30 minutes a week of learning only those things the teachers wanted Catie to learn.

A Special Teacher for Catie

I could imagine Catie's enthusiasm for the piano drying up after only a couple lessons. So I said good-bye to the teachers, and, instead, went out and bought a special piano teacher for Catie—the Colortone Keyboard. The keyboard works with our Commodore 64; it costs \$79.95 and is available from:

Waveform Corporation
1912 Bonita Way
Berkeley, CA 94704
(415) 841-9866

The Colortone Keyboard is a flat membrane (touch-sensitive) plastic keyboard, measuring 9-1/2" by 15", with two octaves of piano keys and 14 special-function keys. It plugs into the first joystick port on the 64. A disk program comes with the keyboard and must be loaded before the keyboard will work.



Catie uses the keyboard to do six things she cannot do by herself on the piano. First, she plays the rainbow-colored "Touch Harp" strip above the piano keys and creates beautiful sequences of notes like waves breaking on a shore. Freeing her from pressing the individual keys on a regular piano keyboard enables her to create melodies based on many more notes and from more complex patterns of notes.

Second, when Catie creates her own music, certain keys are masked and are not playable. This helps her create songs that sound good without a great deal of painstaking effort. It's like putting Catie on a pair of musical roller skates. She creates songs twice as quickly as she does on a piano because she can play more notes easily (with her relatively short fingers), and she feels confident enough to experiment.

Third, when she creates a new song, she almost always records it and saves it to disk. Later in the day, or that evening, we hear Catie creating new music, and we hear a "recital" of songs Catie has composed, played, and recorded earlier in the day.

This ability to recall music she made earlier has helped give Catie a historical, or comparative, perspective when creating new music. Now she can browse through songs she created yesterday or last week, and relate them to what she is creating now. Often she creates new songs by borrowing, refashioning, and ornamenting portions of earlier songs.

Fourth, Catie gets to see the notes on the screen as she plays them. This has helped her get an appreciation for "written music" as opposed to music that she makes up herself or plays by ear. Catie has learned how to sight read music by noting which keys generate which notes on the screen. She has taken this skill back to the piano, where she is teaching herself to read sheet music and to copy down some of her own songs onto sheet music paper.

Fifth, thanks to the Colortone Keyboard and software, Catie now looks at creating music the same way she looks at writing a story on a word processor. She no longer whips out a piece of music, then abandons it, going on to something new. Instead, she edits, plays, and fiddles with everything she creates. She chooses from 12 musical scales and changes the scale of the piece up or down. She chooses from eight musical instruments and shifts back and forth between instruments. She speeds up the tempo of the music, or slows it down. And she fixes on certain bars in the music that she really likes, and she plays them over and over (like "Heart And Soul"). Later, she uses these bars as musical "ideas" in her new songs.

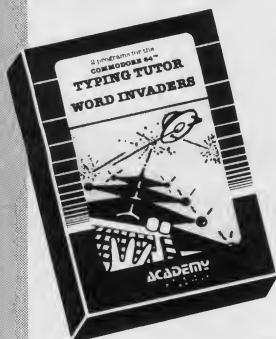
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COMPUTING for families

“Easy-Play” Computer Peripherals For The Family

Fred D'Ignazio, Associate Editor

My First Teaching Machine

Ever since I was little, I have been fascinated by the idea of self-directed learning—learning at home, learning on the job, learning outside classroom walls. Associated with this fascination has been the compelling belief that an average person could learn almost any subject if it was taught right.

Even the most complex subjects—computers, mathematics, astronomy, physics—can be exciting and understandable if they are introduced correctly to a beginner. What matters is *how* they are introduced.

When I was a kid, I sent away for a “teaching machine” advertised in the mail by Grolier, Inc. I had visions of the machine teaching me all sorts of exotic subjects like analytical geometry, nuclear physics, and molecular biology. I saw myself zooming ahead of the other kids in my class and skipping grades right on through college.

When the machine arrived, it was just a blue plastic box, and I was terribly disappointed. The machine let me take “courses” by placing a stack of lesson pages inside the box. The box was really just a “high-tech” textbook with multiple-choice questions at the end of each lesson. I rolled the pages through the machine, and the questions appeared in a little window at the top. When I had filled in my answer, I could open an adjoining window to peek and see if my answer was correct.

The Personal Computer As Teaching Machine

When personal computers began appearing on the scene in the late 1970s, my hope was revived that here, at last, was a teaching machine that I could use to learn all sorts of new things. Unfortunately, the early computers were such primitive devices that I spent most of my time trying to master the computer itself, and very little time learning anything else.

Turning Beginners Into Experts

As the personal-computer revolution advanced, I discovered that there were many other people who shared my interest in using computers as teaching machines. A couple of years ago, for example, I had a conversation with Alan Kay, one of our country's leading computer scientists. At the time he and I talked, Kay was working on the Smalltalk project at Xerox's Palo Alto Research Center.

Although Smalltalk was an extremely advanced “operating environment,” Kay was frustrated because it did not measure up to his vision. Kay wanted personal computers to lead naive beginners efficiently and painlessly into any subject until they would be thinking and acting like experts.

Kay and his colleague Adele Goldberg tested Smalltalk by ushering a steady stream of children, musicians, artists, businesspeople, and homemakers through their labs at Xerox. Everyone played with Smalltalk while Kay and

Goldberg watched. They learned that Smalltalk was, indeed, a simple yet powerful personal-computer environment. Even little children could operate it at a superficial level. But Smalltalk did not, on its own, convert a beginner into an expert in any subject.

Pathways To Powerful Ideas

Another person fascinated with using the computer as a "self-directed learning machine" is Seymour Papert of MIT. In his work in MIT's Artificial Intelligence Lab, Papert has attempted to build pathways beginners can follow to learn more about new domains of knowledge—what Papert calls "powerful ideas."

In his landmark book, *Mindstorms: Children, Computers, and Powerful Ideas* (Basic Books, 1980), Papert wrote about how even young children can learn complex concepts and subjects by using the programming language Logo, and various "discovery learning" methods that Papert introduced during the 1970s in his AI Lab and in various Boston-area elementary schools.

Today Logo has become a major educational computer language. However, educators are just beginning to realize that Logo, on its own, cannot do all the wonderful things Papert envisioned. On its own, Logo is a rather simple graphics and list-processing language. Like Smalltalk, and like my Grolier teaching machine, Logo is not the vehicle that automatically whisks eager beginners into new realms of knowledge.

Easy Learn Vs. Easy Play

Today there's a flood of new software products and peripherals appearing on the market for personal computers like the Commodore 64. Recently I've noticed the use of the word "Easy" as a prefix to many product names—such as *Easy Key*, *Easy Type*, *Easy Play*, and so on. To read the manufacturer's claims for its products, you'd think that the age that Kay, Papert, I, and many others had hoped for had finally arrived. "With these simple yet powerful tools," claim the manufacturers, "you can learn to use your computer to ----- (fill in the blank) like an expert in just a few minutes."

The age of "Easy Play" has indeed arrived. With the right software, your Commodore computer can now fit in the same category as your Easy-Click camera, your Easy-Roast microwave oven, your Easy-Music organ, and your Easy-Goal foam rubber football.

With "easy-play" software and peripherals, personal computers are on their way to becoming mass-market home appliances, because to be mass-market they must be an appliance that everyone can operate. But the question is this:

When you operate your computer, are you learning anything?

So far, manufacturers have not converted computers into total black boxes with their "easy play" mass-market philosophy. They have created products that can be operated at two levels—the easy-play, beginner's level and the expert level—but there is nothing in between.

If you're a beginner and you just want to sit down at your computer and make fantastic doodles, then you can use the easy-play mode. Or, if you are an expert, and you are already trained in visual arts, music, or whatever, you can read the manufacturer's manual and do serious work (or serious play) on the computer.

But what if you are somewhere in between? How do you go from easy-play to the expert level? So far, there are no products that offer this feature—and make it work.

Beyond Computer Popcorn

In January 1984, I wrote an article called "Computer Popcorn" for my "World Inside The Computer" column in *COMPUTE!*. In that article I described new products like the KoalaPad touch tablet from Koala Technologies and the music-composition program, *Music Construction Set* from Electronic Arts, as popcorn: They were so good that once I started using them, I couldn't put them down.

But I have now.

For me, "computer toys" are still fun, but *they aren't taking me anywhere*. They're great for doodling and "fooling around," but I no longer learn when I use them. In fact, they have taught me very little. They are too diffuse, too open-ended, too undirected. They are super tools, but I have only the fuzziest idea about how to make them work.

Plus, they make me feel guilty. After all, they have such great learning potential. Why am I so dumb and so lazy that I can't pick them up and learn on my own? After all, Beethoven and Picasso never had a personal computer, and look how well they did.

Skating Along The Surface

Last spring I moderated a panel at the Billboard Conference on Computer Software. Bill Budge, the designer of *Pinball Construction Set* and other marvels, spoke at that conference and said that he was worried that software designers were designing new products that might outstrip people's ability to use them. The products were getting so deep, so powerful, and so complex, that they were intimidating to the average user.

Today, after looking at some of the new fantasy games, some of the graphics and music-

synthesizer products, and some of the new productivity tools like Lotus's *Symphony*, I agree.

And what a shame. The personal computer revolution is not succeeding if all we can do is create more and more powerful computer tools and make them off-limits to regular human beings. It's terribly frustrating to read about newer, more powerful computer tools and realize that if I used them I would spend all my time skating along the surface and never learn how to plumb their depths.

A Hidden Curriculum

Because the new computer tools are dazzlingly complex, many manufacturers have incorporated an "easy play" operating level for most of us, and they have thrown in the "expert level" commands to try to appeal to people who already know what they're doing in a particular area.

But how about something in between? How about a *hidden curriculum* for the thousands, or millions, of us who are eager—but very timid—learners, who want to learn some of the tricks of the experts but who want to remain in control and not just "play" the computer like a black box?

Unfortunately, a hidden curriculum does not translate into more user-friendly manuals, help screens, mice, or icons. These give us a firmer grip on the computer "lever," but they don't tell us how or where to direct the lever.

Likewise, onscreen tutorials and computer activity books are also not part of this curriculum. Tutorials teach us only the *mechanics* of the tools, not how to use them artfully, expertly, and creatively. And activities are things we do when we have reached a learning plateau, and when we need to practice skills we have already learned. But first we need someone—or something—to teach us the skills.

What we need are tools that teach us about themselves *and* about the powerful ideas that underly their existence. We need music products that give us a grounding in musical theory and composition; graphics products that teach us about art, drawing, and painting; flight simulators that teach us what all those controls on the dashboard are for; and astronomy programs that start with the sun, the moon, and the Big Dipper, and not some fictitious faraway galaxy.

We need the manufacturers to put us on some kind of learning path—the hidden curriculum—without shackling us to anything that would be too long, too technical, or too demanding for a home recreational environment. The curriculum should have as its goal,

through *directed play*, the mastery of different techniques commonly associated with expertise in a given field.

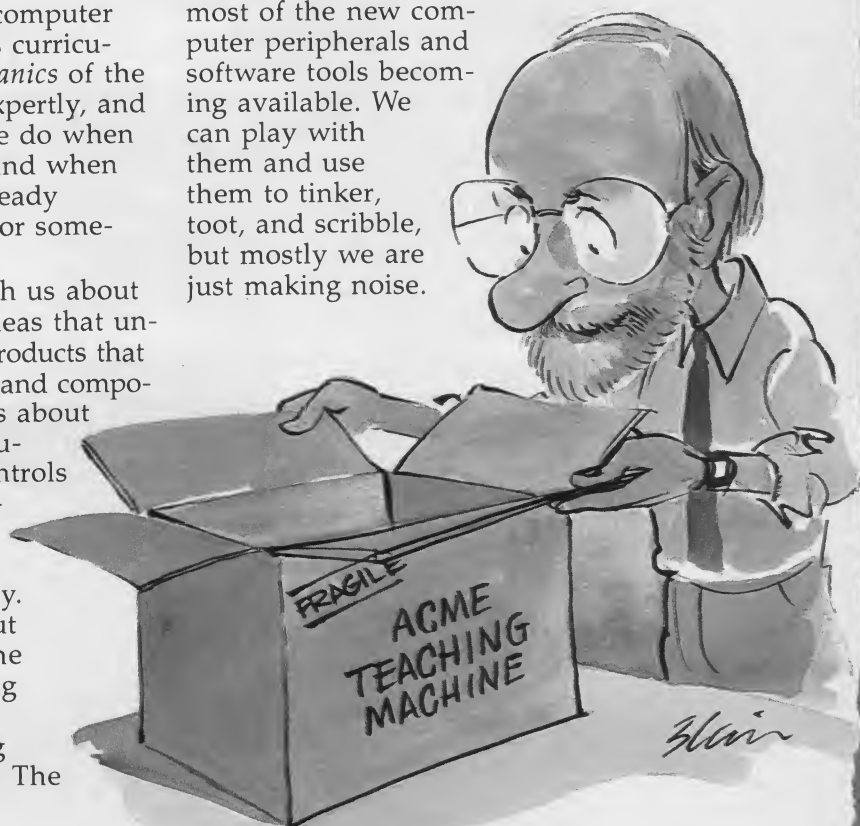
After a person learned a technique, he or she would be free to play with it on a word processor, music processor, art processor, or whatever. Then return to the curriculum and learn something new. A person could continue dipping into the curriculum as schedule and interest allowed. And the reward for following the curriculum would be the incremental mastery of all the features offered by the software tool. A beginner could take pleasure knowing that the result looked like it was done by an expert. And that the expertise acquired and the music or artwork created were not just computer sleight-of-hand.

Self-Teaching Tools

When I was a child, I had a fantasy that one day I would slip into an empty orchestra pit and be allowed to play with all the musical instruments the musicians had left behind. I saw myself playing violins, oboes, harps, and grand pianos. I tooted tubas, banged on drums, and strummed bass violins like a jazz virtuoso.

Now, as an adult, I realize the futility of this dream. Even if I had been left alone with a score of musical instruments, I wouldn't have been able to play them. No one had ever taught me how.

The same is true of most of the new computer peripherals and software tools becoming available. We can play with them and use them to tinker, toot, and scribble, but mostly we are just making noise.



But what if the tools taught us the powerful ideas embedded inside them? Then they might become the teaching machines I dreamed of as a child.

Some Easy-Play Toys For Your Commodore 64

The theme of this month's GAZETTE is "computer peripherals," so I'd like to mention a few peripherals that have the greatest potential to become self-teaching tools—if they are supplemented with the right print materials and software.

In fact, the major limitation with the products I'm going to mention is the scarcity of *any* kind of support materials. On the other hand, all the products mentioned below are "plug-and-go" products. You plug them into your 64, and at least you can do something.

Educational Keyboards

The Muppet Learning Keys keyboard from Koala Technologies (with Sunburst and Henson Associates) is intended for children ages 3 and up. It features colorful graphics, big letter keys arranged in alphabetical order, and all sorts of useful keys like Go, Stop, Oops, Zap, Eraser (which looks like a pink rubber eraser), and Help. One disk comes with the keyboard, but much more software and print materials are needed to turn this product into an entry-level keyboard and reading, writing, and arithmetic tutor.

Some software packages are appearing with their own keyboard overlays. Three CBS Software products, for example, come with EasyKey, a plastic keyboard overlay produced for CBS by Neosoft, Inc. One of these products is *Letter-Go-Round*, written by software designers at the Children's Television Workshop (CTW is the home of Sesame Street and Big Bird). *Letter-Go-Round* is a simple letter-matching and spelling game, but it is significantly enhanced by the EasyKey overlay. The overlay fits atop your Commodore 64 keyboard and "customizes" the keyboard for the *Letter-Go-Round* program. Instead of having to cope with dozens of keys arranged in a mysterious order, your child just has to search for pictures of Grover, Barclay the dog, Cookie Monster, and a big pink Stop button.

Touch Tablets

The two favorites around our house are Koala Technologies' KoalaPad and Suncom's Animation Station. Both pads come with lots of separate software packages and a drawing program (on disk). Animation Station also has helpful features

like an Undo button (to undo mistakes), a holder for the plastic stylus you use in drawing on the tablet, and a pair of legs to prop up the tablet on the table where you are working. In addition, *DesignLab*, the drawing program that comes with Animation Station, has a wraparound menu that lets you view your picture and the drawing commands at the same time; a variety of character fonts for labeling and titling your drawings; and other color-selection and "cut-and-paste" commands.

However, both products lack self-teaching materials and a "hidden curriculum" that would make them much more educational than they are now.

Musical Keyboards

Many companies are beginning to make musical keyboards for the Commodore 64, including Waveform, Inc. and Sight & Sound Music Software, Inc. The Waveform keyboard is a flat, membrane keyboard with a cable that attaches to the Commodore 64 via user port 1. Sight & Sound's keyboard is a plastic overlay that slips over the top of the Commodore 64 keyboard. Each keyboard includes 25 keys spanning two octaves. Both companies back up their products with an impressive array of music-synthesizer software. However, my family has taken a liking to the Sight & Sound keyboard for three reasons: It has more musical games (such as "Tune Trivia," "Music Video Hits," and "Solid Gold") for the family to play; it has a disk (*3001 Sound Odyssey*—sold separately) that teaches you some of the fundamentals of operating a computer music synthesizer; and it has "real keys" that move up and down instead of flat, membrane keys.

Both products have great potential but lack a hidden curriculum or "courseware" to introduce the rank beginner to music's many powerful ideas.

Light Pens

Two fairly inexpensive light pens for the Commodore 64 are the Edumate light pen from Futurehouse, Inc. and the Tech Sketch light pen from Tech Sketch, Inc. The Tech Sketch pen comes with the *Micro Illustrator* graphics-and-drawing program. Futurehouse sells the *Peripheral Vision* drawing program for its Edumate pen, but you must buy it separately.

Both pens are easy to use, and the drawing programs are a lot of fun. Also, Futurehouse has a variety of educational and productivity programs for the Edumate pen that enable you to use it as an alternative to the computer keyboard. However, neither pen has materials that teach an unskilled beginner how to create any advanced art or graphics beyond making circles and boxes

and filling them in with pretty colors. Both pens have great potential as self-teaching tools once the right software and print materials are made available.

The Muppet Learning Keys (includes Sunburst disk)
Koala Technologies Corp.
3100 Patrick Henry Drive
Santa Clara, CA 95052-8100
(408) 986-8866
\$79.95

Letter-Go-Round (disk and EasyKey included)
CBS Software
One Fawcett Place
Greenwich, CT 06836
(203) 622-2500
\$34.95

Koalapad (drawing program included)
Koala Technologies Corp.
3100 Patrick Henry Drive
Santa Clara, CA 95052-8100
(408) 986-8866
\$99

Animation Station (drawing program included)
Suncom Inc.
260 Holbrook Drive
Wheeling, IL 60090
(312) 459-8000
\$89.95

Colortone Keyboard (music program included)
Waveform Corporation
1912 Bonita Way
Berkeley, CA 94704
(415) 841-9866
\$79

The Incredible Musical Keyboard (disk/books included)
Sight & Sound Music Software, Inc.
3200 South 166th Street
New Berlin, WI 53151
(414) 784-5850
\$49.95

Edumate Light Pen (pen and Peripheral Vision drawing program)
Futurehouse
P.O. Box 3470
Chapel Hill, NC 27514
(919) 967-0861
\$59.95

Tech Sketch Light Pen (pen and Micro Illustrator program)
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COMPUTING for families

The World Of Mimi The Ant

Fred D'Ignazio, Associate Editor

What Is A "Fourmi"?

Recently I received a letter from Monique Gosselin of Logidisque in Montreal, Canada. Monique asked me to take a look at a program called *Mimi* by Anne Bergeron. *Mimi* is an early-learning program for the Commodore 64 that Logidisque had just begun shipping.

I unpacked the program from the mailing wrapper, but when I saw the program's manual, I panicked. The manual was short enough—only eight pages—but it was written entirely in French.

Luckily, my five-year-old son Eric was hanging around, and he spotted the cartoon on the front of the documentation. It looked like a little child playing a flute. Except that the child had antennas.

"What's that?" Eric asked.

"I don't exactly know," I told Eric. "Except I don't think it's human."

I looked at the directions. The program's title said, "MIMI: Les aventures de Mimi la fourmi."

"Mimi's a 'fourmi,'" I told Eric.

"What's a fourmi?" Eric asked.

I knew he would ask that. "Just a second," I told him. I ran upstairs and dug a French-English dictionary out of my daughter's bookcase. I looked up "fourmi" and found that it was an "ant."

A Visit To Mimi's World

"C'mon," I told Eric, when I returned to the computer. "Let's take a look at Mimi."

Eric and I booted the *Mimi* disk and entered Mimi's world.

Mimi's world was quite simple. At the lower lefthand side of the screen was Mimi's house. The house was cut away on the side so that we could see in. A pathway led from Mimi's house to a bridge over a tiny stream. Past the stream



Day ("jour") . . .



and night ("nuit") in Mimi's world.

the path wound around a tree and out of the picture. In the lower righthand part of the stream was a pond fed by the stream.

The picture was simple, but it was well-drawn and had a charming, storybook character. Mimi, too, was appealing. She walked upright and was dressed in overalls and bare feet. Except for her antennas, she resembled a child more than an ant.

Joining Mimi in her world were a worm (le ver), dancing snails (les escargots), a bee (l'abeille), fireflies (les lucioles), and butterflies (les papillons). Since Eric and I couldn't understand the directions in the manual, we began randomly pressing keys on the Commodore. It didn't take us long to figure out that what we were watching was an animated, choreographed picture book accompanied by music. Each time we pressed a key, Mimi or her friends would do something different.

At first Eric and I just experimented by pressing the different keys and watching what happened. Soon, however, we wanted to repeat certain keys, so I opened the manual and discovered a summary of the letter keys and their associated scenes and music.

I had a smattering of French in college, and the descriptions were simple and brief, so I began to understand a little of what was going on. "Push N for nuit," I told Eric. Eric pressed the N key and the sun set, and the moon came up; it became "nuit."

"Press J for jour," I said to Eric. He pressed J and the moon set, and the sun rose. Once again it was "jour."

About that time something magical began happening. Eric and I had traveled into many different microworlds inside the computer, but somehow entering Mimi's world was different. Maybe it was because the "keys" to the world were all in French, and they seemed romantic and mysterious.

Or maybe it was the music, which was unlike anything we had heard on the Commodore 64. It was simple but very fresh and uplifting—something that I associated with a good movie or video animation for children. Along with familiar songs like "Happy Birthday" ("Bonne Fête") and "Frère Jacques," there were many new songs like "Poire, Poire," "Abricot," "Dame Tartine," and "Roi Dagobert," and "Extrait de la Sonate no. 1 de J. S. Bach." Later, I learned that the songs were a mixture of popular French nursery rhymes, folk songs, and classical melodies.

Perhaps the most entrancing part of the program was its seeming ignorance of the heated debate about children's software. Almost all the educational software my children and I had seen

was either game-oriented, drill and practice, or a "tool kit" or "builder kit." But *Mimi* wasn't any of these things. There was no sense of Mimi or her world being mechanically contrived to "motivate" or "educate" a child. Instead, Mimi and her world simply existed. And by being natural (like the characters and scenes in a good movie or picture book), they beckoned Eric and me to believe in them and to enter their world.

Perhaps the most magical scene in the program is when the child presses the R key for rêve (dream) after pressing the N key for nuit (night). Mimi walks over to her bed, lies down, and goes to sleep in her darkened house. Then Mimi's dream begins and a "dream Mimi" floats out of bed, up through the ceiling of her house, and up into the sky. Mimi lands on the crescent moon and swings while the computer plays "Ah! vous dirais-je Maman" ("Twinkle Twinkle, Little Star"). Then, the dream Mimi goes back into her body, and the dream ends.

Learning French With Mimi

When Eric pressed B, Mimi took a baignade (bath) in the pond. When he pressed D, Mimi did a danse (dance) on the bridge with the little ver (worm). While the ant and the worm danced, the computer played the familiar French tune, "Sur le pont d'Avignon."

In each case, the letter Eric pressed corresponded to the first letter of a French word. As Eric and I played the game, we began talking more and more in French. I began reading the French directions in the manual out loud, and we began referring to the scenes by their French names: Miel (honey), Violettes (violets), and s'Habille (Mimi gets dressed).

Some of the letters—and scenes—only work in daytime or nighttime, and if Eric tried to do them without pressing the J (jour) or N (nuit) key first, I would get excited and shout, "No, jour!" or "Nuit!" The crazy thing is that Eric understood me and made Mimi's world turn into day or night.

Eric's two favorite scenes were Mimi's dream (le rêve) and when the little worm sneaks into Mimi's house and hides (se cache) in Mimi's closet. Eric would press Q to make the worm (le ver) hide, and U to make the mischievous little fellow pop out of the closet and surprise Mimi.

The Mimi Storybook

After a week of playing *Mimi* daily, Eric and I finally discovered that by pressing the + and - keys, we could speed up and slow down the scenes. This produced some humorous effects and revived Eric's interest in several of the scenes.



Anne Bergeron, seated between two admirers, and her brother, Eric Bergeron.

A couple days later, Eric was fiddling around with the Commodore 64 keyboard, and he stumbled into a menu with four activities. After experimenting, we found that *Memoire Courte* (Short Memory) would let us create a Mimi "story" by letting us record a sequence of two scenes in the computer's memory. *Memoire Longue* (Long Memory) let us create an ambitious Mimi story with up to ten scenes. When we chose *Retour à Mimi*, the computer returned us to Mimi's world. When we pressed the f7 key, the computer started the story. (We learned we could stop the story by pressing the f5 key.)

To actually create a story we had to choose the *Enregistrement* (Recording) option. Then we reached a second menu. By making choices from this menu, we found we could press several letter keys and compose a new story, or press the cursor keys and the DEL key and edit an existing story. We could attach speeds to each scene in the story by pressing the + (speed up) or - (slow down) key.

A Conversation With *Mimi's* Author

I had the opportunity to have lunch with Anne Bergeron, the author of *Mimi*, while I was in Montreal as a speaker at the second international "Computers in Education" conference sponsored by McGill University. I bumped into Monique Gosselin of Logidisque and she arranged for me to interview Anne over lunch the following day.

Bergeron turned out to be just as fascinating as Mimi. She was a mother, a mathematician, and a programmer. She told me that she had

bought a Commodore 64 only two years earlier as a gift to herself for Christmas.

The computer was supposed to be her toy, but as soon as she sat down at it, her 18-month-old daughter Aleck wanted to climb in her lap and bang on the keys. Anne let Aleck bang, and she also began searching for a program that would be appropriate for Aleck to use. After failing to find anything worthwhile, she gave up the search and set out to write a program of her own.

During the day, Anne worked as a mathematician, and her daughter went to day care. At the end of the day, Anne would pick up Aleck and her three-year-old niece Anouk, and they would go home. She worked with Aleck and Anouk at least a half hour every night, asking them what they would like to do on the computer and letting them test different children's programs she was writing.

When Anne began writing *Mimi*, she knew nothing about programming, and she didn't know English. She soon gave up on programming manuals, and began reading *COMPUTE!* to learn how to program. Less than a month later, she grew frustrated with how slowly her programs ran in BASIC and she began learning machine language.

Over the next six months, *Mimi* began to take shape. Anne listened carefully to her daughter and her niece's suggestions, and watched them play with *Mimi*. At lunch she told me, "They had lots to say. Sometimes just one question presented me with a whole week of new programming."

The kids' questions and suggestions continued, but after six months Anne was finished—

except for the music. "I knew nothing about music," Anne said. "But my brother Eric did."

Anne enlisted her 16-year-old brother's help, and they tracked down 26 songs that they could match with the 26 letter keys on the computer keyboard. Eric arranged all the songs, and he and Anne programmed them in machine language.

A New Mimi

Last summer *Mimi* competed along with 300 other programs from all over the world and won a special prize at the Avignon International Software Festival. Anne and Eric went over to the SICOB Trade Show in Paris in September and accepted the prize in *Mimi's* honor.

Mimi's success led Anne to start working on *Mimi Two*, which she says may be published very soon. Working with Anne on the new *Mimi* program is Pierre F. Brault, the composer and musician who creates the music for Canada's acclaimed "Passe-Partout" TV program for young children. According to Anne, "Passe-Partout" is Aleck's favorite program. It's the French equivalent of Sesame Street. Pierre is composing all original computer music for *Mimi Two*, and the program will begin with a song entitled "The Mimi Symphony."

The Inner Mimi

Part of the magic of *Mimi* is the program's gentleness and accessibility, even to a very young child. According to Anne, "In *Mimi*, there is no concept of right or wrong answers. Everything a child does is constructive."

Anne says she started out thinking of *Mimi* as a book. "Each scene is like the page in a book," she said. "But then I saw that it was more than a book. In *Mimi*, you can mix up the pages. You can make up your own books."

Anne continued: "Actually, *Mimi* is a little film. When I watched TV with Aleck, she always wanted me to reverse the show, so she could understand it. But she can do that with *Mimi*. She can slow *Mimi* down. And she can play *Mimi* over and over until she understands each scene."

I asked Anne how Aleck and her cousin Anouk used *Mimi*. She said that, despite appearances, *Mimi* was not software for learning letters; that was a side effect.

"*Mimi* is there for discussion," said Anne. "The child needs someone there to talk to and discuss what happens when she presses a certain key."

"Little children can use *Mimi* to learn how to talk, sing, dance, construct a story, and impress friends."

"Impress friends?" I asked.

"Aleck is only three and a half," said Anne, "but she is an expert on *Mimi*. When a big kid (someone 5 or 6) comes over, Aleck is the teacher. She announces a *Mimi* scene before it happens, and she feels important. 'Look at what *Mimi* can do!' she says."

"Will *Mimi Two* be like *Mimi One*?" I asked.

"Now that I am done, *Mimi One* looks easy," Anne says. "*Mimi Two* will be much better. It will be baroque—each time children look at it they will see something new and delightful. There will be a *Mimi* disco that encourages children to dance with their friends. And there will be all sorts of guessing games for *Mimi* and the children to invent."

An English Mimi, Too

Mimi runs on the Commodore 64 computer with a disk drive. It now comes in English as well as French (though I would still recommend the French version). Each version costs \$34.95.

To order *Mimi* or to find out more information, contact:

Logidisque Inc.
C.P. 485 Succ. Place D'Armes
Montreal, Quebec
Canada H2Y 3H3
Phone: (514) 842-5221 or (514) 842-9551

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COMPUTING for families

Real World Software

Part 1: A Bright New Trend In Home Computing

Fred D'Ignazio, Associate Editor

VisiCalc For The Home?

I recently returned from Las Vegas, where I covered the Winter Consumer Electronics Show (CES) for *The New Tech Times*, a national public TV program on consumer electronics. Based on what I saw, this is my verdict:

The home-computer industry is at its lowest point in years. Home computers are no longer the "in" thing to buy. They have been replaced by VCRs, compact discs, pocket TVs, and other glamorous newcomers to the consumer electronics industry. As a result, hardware and software companies have gone out of business, computer magazines have shrunk for lack of advertisers, and Wall Street investors and the national news media have lost interest and are looking elsewhere for what is new and hot.

Some observers have equated home computers with videogames and hoola hoops, and have predicted the demise of the home-computer in-

dustry. But I think this assessment is too gloomy. I don't believe we're at the end of the home computer revolution, we're only in a trough.

What will get us out of that trough?

A new generation of even lower-priced, even more powerful computers, like Atari's new ST series and Commodore's Amiga, will give the industry a tremendous boost. But fancy new computers are not the only way to revive this industry. We also need new kinds of software—programs that are so exciting, low-cost, and practical that they will motivate people to buy a new computer just so they can run the software.

What kind of software should we look for? Some observers are on the lookout for a "VisiCalc of the home"—a product so unique and powerful that, single-handedly, it will answer the consumer's still nagging question, "Why do I need a home computer?"

I think it's unlikely that a single program will emerge and provide a compelling justification for buying a home computer. Home computer users are too diverse a group, and homes are too complex and heterogeneous for a single product to answer everyone's needs. Instead, I think that we should look for a whole new genre of home software that thrusts the computer into the real world. I see such a genre now on the horizon, a genre I call *real world software*.

What Does It Feel Like?

This month and next I'll describe, define, and give examples of what I mean by real world software. But these are just words. The ultimate test

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is to try the software out and see how the software feels to *you*. You'll recognize real world software when you come in contact with it. And it will mean something different to each person who experiences it.

As I prepared this column, I spoke to many different people in the software industry. When I told them I was writing an article about "real world software," the amazing thing was that they immediately knew what I meant, even before I tried to define it or describe it. And they began telling me what real world software meant to them and what examples they had seen recently.

One person I spoke to had this reaction: "Real world software. *Kitchen sinkware*. Stuff that you keep around the house like a bottle of glue, a flashlight, or a screwdriver. You never know when you'll need it. But you will."

When I told my assistant, Kim Harris, about real world software, she thought of her boyfriend, Robert Ruff. "Robert is working on a construction crew," she told me, "building a new shopping mall. He's so happy because he's learning valuable things about architecture, electronics, and engineering. He'd rather learn this way than study books in a classroom. Maybe that's what real world software is. It's *on-the-job training*, the kind that Robert likes."

When I mentioned real world software to Jeff Clarke, executive producer of *The New Tech Times*, he too instantly recognized it. "It's like the high-tech stress cards we're giving out at CES," he said. "The cards tell you whether you're relaxed or tense, and, if you are tense, they give you simple techniques you can use to relax. The cards are like your "real-world" software should be. They are simple to use, and they give immediate, personally meaningful information and results."

What Should It Do?

Based on the comments above, defining real world software is easy. It's easy-to-use software that gives an immediate, direct, visible benefit to a person in his or her daily life.

As I see it, real world software is really *self-improvement* software. It gives you the skills you need to tackle all areas in your life more creatively and effectively.

When I talked to John Paulson, president of Springboard Software, he warmed immediately to the idea of real world software. "That's just what we need," he said. "With real world software the computer will beckon, teach, work for you as a tool, then send you out armed and eager into the real world to apply the skills you have learned."

How Does It Work?

The goal of real world software is to be a *self-teaching tool*. To do this effectively, it needs to weave together several key elements, including a knowledge database, skill in applying that knowledge base to real life, and a playful approach that makes it fun to learn the knowledge and apply the skill.

Real world software must be a powerful tool. But it must also teach us how to use the tool, give us practice in applying the tool, and thrust us into real-life situations in which we get to use the tool and improve our technique. Last, it must suggest applications in the real world where we can apply the tool after we have left the computer.

What features should real world software have? First, it should be simple to learn and simple to use. It must be immediately accessible to a child or a beginner of any age.

Beyond that, it must be playful, charming, and appealing to young and old alike. As John Paulson put it, the software must *beckon*. It makes learning a new skill a thrill, not a chore.

The program should also let a person get right to the action. The mechanics of the program should be so easy to master that a person can go immediately beyond the program to the knowledge areas, skills, and applications the program teaches.

On the other hand, the program should not be a black box, blocking the naïve user from its power; or a child's toy that has no relevance outside a toy world.

Rather, it should be at once simple yet powerful. The rules for using it should be intuitively obvious. As the person uses it, he or she should become more adept at using it further. The program should let a person *learn on the job*.

Third, there should be a strong factual basis to the knowledge that the program imparts. Real world software is really *expert software* that everyone can use.

Fourth, the program should use the latest ideas in program design, including icons (pictures representing information or courses of action); contextual help screens; on-screen menus or pull-down menus; and a choice of mouse, joyboard, or keyboard control (or a user-determined mix of all three).

This is a controversial area with lots of conflicting opinions. As Marc Canter, president of MacroMind (developer of the Macintosh *MusicWorks* and *VideoWorks* programs from Hayden Software) says, "The world is divided into two camps: people who type in commands and people who don't; people who memorize commands and people who don't." Canter is one of those people who doesn't like to memorize or

type in commands and says, "I never want to go back." Then there is Richard Mansfield, senior editor of COMPUTE! Publications, who wrote in the February 1985 issue of COMPUTE!, "It's far easier, for many people, to simply type LOAD 'PROGRAM' than it is to move a mouse to a menu, pull down the disk menu, move to the program name, move the mouse up to the word LOAD, etc."

Canter is in one camp, Mansfield in the other. This is why people should have a *choice* in the way they interact with a real world program. And they should be able to customize their own means of interaction.

Next, a real world program should contain several discrete modes, including introductions to the tool, knowledge area, and skill in using the tool; an online tutorial; challenging real-life scenarios for practice; and the actual tool itself once the user is ready to get down to business.

The actual tool should have shades and gradations beginning with novice and ending with expert. The software should enable each person to use the tool unconsciously at his or her level of confidence and expertise.

The software should be powerful enough to be attractive to experts; but, more importantly, it should offer the beginner a step-by-step approach to learning a new skill, with numerous opportunities to practice the skill and get immediate, constructive feedback.

Sixth, real world software should come with a substantial users' manual. The manual shouldn't waste time explaining the software; the software itself will take care of this. Instead, it should be a practical yet literate introduction to the knowledge embodied in the software, and a checklist of the powerful ideas and techniques embedded in the tool. It should also be an idea book full of suggestions and activities a person can do with the software.

Seventh, the software should be supplemented with additional, lower-cost software packages with databases, templates, and other supplies that help personalize the software for different users and introduce users to different subjects. It should also, of course, let users enter their own databases.

Eighth, the software should have easy-to-use recordkeeping features that enable a child, parent, or teacher to monitor a learner's progress as part of the software's *hidden curriculum* in a particular discipline or domain of knowledge.

Ninth, the program should place great emphasis on on-the-job, practical training in the context of an adventure, a mission, or a story. A person should be given real-life situations, goals, and challenges. Mastery of the skill should permit them to meet these goals and overcome these

challenges. Then the software should rush them out the door and urge them to apply the skill immediately in the real world.

On-the-job training, real-life situations, and immediate transfer to the person's daily life are the key features. The program should combine the cerebral, bookish world of the ivory tower with the do-or-die immediacy of the space shuttle cockpit, the scientist's lab, the executive's hotseat, or the ditchdigger's muddy hole. The force of intellect in all human advances is derived from a blend of the practical and the abstract. Real world software can merge these two components of knowledge into powerful and beneficial learning programs for home computer users.

Examples Of Real World Software

Have I whetted your appetite for some examples of real world software? If I have, good! Next month I'll give you 106 examples of real world software in 24 different areas of knowledge, including skills in medicine, college studies, communication, crafts, dance, diet and nutrition, exercise, map reading, inventing, math, money management, music, organization, outer space, relating to other people, running a newspaper, predicting the weather, and designing bridges and buildings.

After I give these examples, I'll tell you my wish list for real world software on Commodore computers in the future. And I'll ask you, the reader, what real world software you've seen and what you'd like to see.

Stay tuned. I'll be back next month!

How To Recognize Real World Software

Real world software should:

- * Be simple to learn and use
- * Appeal to all ages
- * Be playful and charming
- * Not force you to learn or remember elaborate commands
- * Get you right to the action
- * Have a strong factual basis
- * Be accompanied by a substantial printed introduction to the skill or subject it teaches
- * Offer supplementary templates, databases, supplies, etc.
- * Offer powerful yet simple recordkeeping features to let you monitor your progress
- * Give you on-the-job, practical training in real-world skills
- * Encourage you to apply your new skills immediately in your daily life



COMPUTING for families

Real World Software

Part 2: A Survey Of Recent And Upcoming Products

Fred D'Ignazio, Associate Editor

What Is Real World Software?

Last month I introduced the concept of real world software: programs that give an immediate, direct, tangible, and visible benefit to a person's daily life.

This month, we'll look at 106 products for the Commodore 64 that most closely resemble my definition of real world software. After we look at programs now available, I'll tell you my "wish list" for real world software I'd like to see on the Commodore 64.

Biology And Medicine

The Body Transparent (DesignWare) is a variation of the popular "Visible Man" and "Visible Woman" kits. *Creature Creator* (DesignWare) and *Mail Order Monsters* (Electronic Arts) let you play Dr. Frankenstein and assemble your own monsters from different body parts. *Fantastic Animals* (Bantam) and *Operation: Frog* (Scholastic) let you build real animals. *The Incredible Laboratory* (Sunburst) is a monster-building chemistry set.

These programs qualify as real world software because some of them teach anatomy, physiology, and biology; and because all of them teach valuable logic and problem-solving skills children can apply to other areas of their lives.

College Success

This is one of the most obvious real world categories. My choices are *Mastering The SAT* (CBS), *SAT Exam Preparation* and *ACT Exam Preparation* (Krell), *The Perfect Score: SAT Preparation* (Mindscape), and *Lovejoy's SAT & College Preparation Guide* (Simon & Schuster). Studies show that these programs have a direct real-world effect: They help students improve their scores on college aptitude and achievement exams.

Communication

This category includes programs people use as communication tools. All of them are "productiv-

ity tools," but I chose them because they're intended primarily for children and other beginning computer users, and because they combine the power of a valuable tool with ease of use. Also, they open up new ways for people to communicate with one another.

SkiWriter II (Prentice-Hall) lets you compose letters and easily send them over the telephone to another person as electronic mail. Penguin's *Graphics Magician* lets you create electronic greeting cards. *Bank Street Writer* (Brøderbund), *Cut & Paste Word Processor* (Electronic Arts), *Mastertype's Writing Wizard* (Scarborough), and Sierra's *Homeword* (with *Homeword Speller*) are excellent, easy-to-use word processors. I also highly recommend *Easy Graph* (Grolier) and Scholastic's *PFS:Report* and *PFS:Write*.

Communication Success

These software packages teach reading, writing, and typing skills. *MasterType* (Scarborough) and *Typing Tutor III* (Simon & Schuster) teach typing. *Magic Spells* (Learning Company) and *Reader Rabbit* (Learning Company) improve young children's vocabulary and reading ability. *Reading Professor* (Commodore) and *The Devil & Mr. Webster* (Krell) teach reading skills to older children and adults. *Grammar Examiner* (DesignWare) and *Grammar, What Big Teeth You Have* (Krell) teach writing and language arts skills to children ages ten and up. And *Welcome Aboard* (Brøderbund) uses Muppets to teach computer literacy.

Crafts

The only program in this category, *Mask Parade* (Springboard), enables children to design and print out their own paper "dress-up" costume, including a hat, face, jewelry and accessories, and feet. They can then color it with paint, crayon, or Magic Marker, and assemble it with glue or string.

Dance/Exercise

These programs—*Dance Fantasy* (Fisher-Price), *Breakdance* (Epyx), *Dancing Bear* (Koala), and *Aerobics* (Spinnaker)—let people of all ages choreograph their own dances and exercises and set them to music.

Diet, Health, And Nutrition

The only program in this category, *The Original Boston Computer Diet* (Scarborough), is appealing because it counsels you on diet and nutrition, and helps set up a personal weight-loss regimen based on diet, eating habits, moods, and behavior. Included is a book with readings on nutrition and diet.

Geography And Map-Reading

This category contains programs that teach with challenging games and adventure scenarios. Children can travel through outer space with Mickey Mouse (*Mickey's Space Adventure* from Sierra) and Winnie the Pooh (*Winnie the Pooh in the Hundred Acre Wood*, also from Sierra). *America Coast to Coast* (CBS) features a special plastic keyboard overlay that enhances game play.

Road Rally USA (Bantam) challenges children to map their way from point to point across the U.S. while overcoming hazards and obstacles. And *States & Traits* and *European Nations & Locations* (DesignWare) enables parents and children to make their own lessons on U.S. and European geography.

Hobby

The only program in this category, *Charles Goren: Learning Bridge Made Easy* (CBS) teaches an older child or adult how to play bridge.

Invention And World Builders

These two categories feature open-ended "mad scientist's laboratories" that encourage you to experiment. *Pinball Construction Set* (Electronic Arts) lets you create a pinball machine that operates under new laws of physics. *Rocky's Boots*

(The Learning Company) lets you build electronic circuits out of logic gates. In *Chem Lab* (Simon & Schuster) you get to perform over 50 experiments and combine chemicals a thousand different ways.

The Factory (Sunburst) lets you build your own factory. In *Racing Destruction Set* (Electronic Arts) you design your own slot cars, then test your designs by racing them. In *The Great Gonzo in Word Rider* (Simon & Schuster) you help Gonzo the muppet rescue his favorite chicken, Camilla, by using "power words" to construct all sorts of marvelous vehicles to find Camilla. In *Creative Contraptions* (Bantam) you get to build your own Rube Goldberg machines. *Dream House* (CBS) lets you design and build your own house; and *Kids at Work* (Scholastic) lets you be architect and construction crew foreman.

Math Success, Money Management, And Professional Success

The programs in these categories teach math, money management, decision-making, problem-solving, and other practical skills. Many of the programs do this by handing you a tough but exciting job and saying, "Here, you handle this!" But they're not without lots of helpful hints and clues from the programs.

I selected the four Math Success programs because they contained several real world software features. For example, *Success with Math* (CBS) is really a curriculum of math programs, each sold separately for \$24.95. The programs are for adults and children ages six and up.

Math/Spelling Teacher (CompuTech) offers excellent feedback on how well you're learning math and spelling. It takes a pedagogically sound, step-by-step approach to teaching math concepts and better spelling habits.

Mission: Algebra (DesignWare) is included because, for the first time, I saw some use to learning algebra. I was set down in an interstellar spaceship and told to rescue a stranded ship. To

Companies That Publish Real World Software For The Commodore 64

Alfred Publishing
15335 Morrison Street
Sherman Oaks, CA 91403
(818) 995-8811

Bantam Electronic Publishing
666 Fifth Avenue
New York, NY 10103
(212) 554-9822

Brøderbund
17 Paul Drive
San Rafael, CA 94903-2101
(415) 479-1170

CBS Software
One Fawcett Place
Greenwich, CT 06836
(203) 622-2673

Commodore
1200 Wilson Drive
West Chester, PA 19380
(215) 431-9100

CompuTech
P.O. Box 7000-309
Redondo Beach, CA 90277
(213) 375-6391

DesignWare
185 Berry Street
San Francisco, CA 94107
(415) 546-1866

Electronic Arts
2755 Campus Drive
San Mateo, CA 94403
(415) 571-7171

Epyx, Inc.
1043 Kiel Court
Sunnyvale, CA 94089
(408) 745-0700

Fisher-Price
One Kendall Square
Cambridge, MA 02139
(617) 494-1200

Groller Electronic Publishing
95 Madison Ave.
New York, NY 10016
(212) 696-9750

Koala Technologies
2065 Junction Avenue
San Jose, CA 95131-2105
(408) 946-4483

Krell
1320 Stony Brook Road
Stony Brook, NY 11790
(800) 245-7355

Mindscape
3444 Dundee Road
Northbrook, IL 60062
(312) 480-7667

Penguin Software
P.O. Box 311
Geneva, IL 60134
(312) 232-1984

Prentice-Hall
P.O. Box 819
Englewood Cliffs NJ 07632
(201) 592-2641

Scarborough Systems
25 North Broadway
Tarrytown, NY 10591
(914) 332-4545

Scholastic
730 Broadway
New York, NY 10003
(212) 505-3497

Sierra On-Line
Sierra On-Line Building
Coarsegold, CA 93614
(209) 683-6858

Simon & Schuster
1230 Ave. of the Americas
New York, NY 10020
(212) 245-6400

Spinnaker Software
One Kendall Square
Cambridge, MA 02139
(617) 494-1200

Springboard
7807 CreekrIDGE Circle
Minneapolis, MN 55435
(612) 944-3912

Sunburst Communications
39 Washington Avenue
Pleasantville, NY 10570
(800) 431-1934

The Learning Company
545 Middlefield Road
Menlo Park, CA 94025
(415) 328-5410

get there, I had to use algebra..

Survival Math (Sunburst) is included because it consists of several real world simulations in which you apply math skills to everyday life.

The Money Management programs are in the same vein. *Tink's Subtraction Fair* (Mindscape) and *Donald Duck's Playground* (Sierra) teach younger children how to budget, count, and manage money.

Older children and adults can become chief executive officers of the *Whatsit Corp* (Sunburst) and manage its rising and falling fortunes. And *HomeWord Money Manager* (Sierra), *The Financial Cookbook* (Electronic Arts), *JK Lasser's Your Personal Money Manager* (Simon & Schuster), and *JK Lasser's Your Income Tax* (Simon & Schuster) act as "teaching tools" to help you structure, budget, and manage your finances.

The Professional Success programs include two excellent model railroad simulations—*Trains* (Spinnaker) and *Railroad Works* (CBS)—and *National Teacher Exam* (Krell), a preparation program, and *President's Choice* (Spinnaker), a challenging game in which you run the country as president.

Music

All the programs in this category attempt to teach music theory and encourage original composition. But, let the buyer beware: They are not the ultimate music teacher for adults or children. But they are a good start.

Song Maker (Fisher-Price) is notable because it's an introduction to music composition for very young children (ages four to eight). *The Music Shop* (Broderbund), *Music Construction Set* (Electronic Arts), *Bank Street MusicWriter* (Mindscape), and *Songwriter* (Scarborough) are all "teaching tools"—musical word processors with guidelines on how to compose your own music.

Rock 'N Rhythm (Spinnaker) lets you to create music in a studio environment. And *Notable Phantom* (DesignWare) places you in a musical adventure.

Three programs from Alfred Publishing (*Music Made Easy*, *Practical Music Theory*, and the *Music Achievement Series*) come the closest to being a real music teacher. They are the software versions of Alfred's popular theory and composition workbooks, and diagnostic evaluations.

Organization, Planning, Reference, And Scientific Method

The programs in these four categories are similar in that they all enhance the way you *think*. The database programs in the Organization category—*Friendly Filer* (Grolier), *Phi Beta Filer* (Scarborough), *Homeword Filer* (Sierra) and Scholastic's *Secret Filer* and *PFS:FILE*—are not just electronic card files. They are keys to new

ways of thinking about information. With these programs you can use the computer to juggle facts the way you shuffle a deck of cards. They let you sort facts, cross reference them, "hide" them, prioritize them, list them, and compare them, all in a few seconds.

You can buy prerecorded databases for use with two of the programs—*Friendly Filer* and *PFS: File*—on important school subjects.

The Planning program, *Educalc* (Grolier), the Reference program, *Mastertype's Facts & Figures* (Scarborough), and the Scientific Method program, *Survey Taker* (Scholastic) let you play with numbers the way you play with facts using the database programs.

Outer Space, Weather, And People Skills

The programs in these three categories encourage learning valuable skills and knowledge and immediately applying them in the outside world. For example, *Halley Project* (Mindscape) puts kids at the control of a spaceship, teaches them how to navigate the solar system, and how to rendezvous with Halley's Comet (coming in early 1986).

Sky Travel (Commodore) is a miniature planetarium inside your computer and a "roadmap" to the heavens. My nine-year-old daughter, Catie, and I use it to find stars, planets, and constellations. I also recommend *Interplanetary Pilot* from CBS.

One of the weather programs, *Forecast!* (CBS), has taught Catie and me how to set up our own weather station and make forecasts. Another excellent choice is *Weather Tamers* from CBS.

Last, the People Skills program, *Many Ways to Say I Love You* (CBS), is the first program from Mr. Rogers' Neighborhood. It lets parents and children (ages 4 and up) construct and send text-and-animated-picture greeting cards with personalized messages.

Story Maker And Print Shop

The programs in these two categories are some of the most wonderful and rewarding I've found. They let you create your own newsletters, newspapers, stickers, buttons, books, greeting cards, cartoons, plays, and animated picture-and-text adventure stories. Many of the programs are accompanied by ideas-and-activities books and by extensive print materials. And the companies offer supplementary packages with extra materials for new projects.

These are true teaching tools. They guide you with suggestions, activities, adventures, and tutorials. Then, when you're ready, they turn you loose to create imaginative projects on your own.

The Story Maker category includes *Build-a-Book* and *Build-a-Book Refill Kit* from Scarborough; *Just Imagine* from Commodore; *Bank*

Street Storybook, *Show Director*, and *Mr. Pixel's Cartoon Kit* from Mindscape; *Kermit's Electronic Story Maker* from Simon & Schuster; *Adventure Master* from CBS; *Story Maker* from Sierra; and *Adventure Construction Set* from Electronic Arts.

The Print Shop category includes *The Print Shop Graphics Library (Disk One)* and *The Print Shop* from Brøderbund; *Color Me* and *Mr. Pixel's Programming Paint Set* from Mindscape; and *News Room* from Springboard.

Fred's Wish List

These 106 programs are just the tip of the iceberg of a new genre of real world software. Here are some programs now available on other computers that I'd like to see really soon on the Commodore 64:

- A paper airplane construction kit (Simon & Schuster) • *Make Millions* (Scarborough), a factual simulation that challenges you to go from rags to

riches while managing everything in real time • Self-improvement programs like diet, nutrition, and stress management programs from Bantam; *Stop Smoking!*; *Make It Click* (using seatbelts); and biofeedback programs from Sunburst • Nutrition, dancing, and "better living" programs from Spinnaker • A piano teacher from Alfred Publishing • Diagnostic tools in math and reading from Krell • A hardware/software science tool kit from Brøderbund • A factual, around-the-world mystery game from Brøderbund that comes with a copy of *The World Almanac* • *Keys to Responsible Driving* from CBS • *Robot Odyssey I* (a robot and microchip construction set) from The Learning Company • *Remember!*, an amazing study aid and homework planner for high school students from DesignWare • *Get Organized!* (Electronic Arts) and *SkiWriter II* with *Mail/Merge* (Prentice-Hall), two easy-to-use, low-cost organizing and communications tools.

Character Assassination

Kent Brewster

This short, easy-to-type-in program can help children and computer newcomers learn their way around the keyboard. Both letter and number recognition are taught. For the VIC and 64.

Quick, where's the Z? Letters and numbers are dropping from the sky, and only by pressing the correct key can you save the city below.

"Character Assassination" is a typing tutorial suitable for almost any age and skill level. It's especially helpful to those learning the keyboard, but can be good practice even for those with some experience.

Preventing Disaster

After typing in the program, type RUN. You are then asked to select a speed. There are ten choices (0-9), with 0 as the slowest and 9 the fastest. After making a choice, be prepared to begin immediately. A multicolored city appears at the bottom of the screen, and your job is to prevent its being destroyed. A random number or

letter falls whining from the top left of the screen toward the city. If you press the correct key, it explodes and disintegrates. The next character begins falling one position from the right of the previous one, and so on, until 40 characters (22 for the VIC) have fallen. After the character in the rightmost column has fallen, the action continues back at the left side of the screen. Your score, at the top of the screen, increases according to the speed and accuracy of your response.

If a character reaches the city, it destroys a building with an ominous explosion. The game ends when the city has been destroyed.

After you begin playing, if you find that the level you've chosen is too easy or difficult, press RUN/STOP-RESTORE, then type RUN and select a new level. Student progress can be monitored by jotting down the level and previous high score.

Each version of Character Assassination is only 25 lines, so it can be typed in quickly. Those interested in the programming techniques will find the short listing helpful to study.

See program listings on page 132.

Computing For Families

FRED D'IGNAZIO, ASSOCIATE EDITOR

Word processors and spreadsheets for five-year-olds? It's not as far-fetched as it seems. This month, D'Ignazio reports on an "idea-processor" program and explains how adult business software can be kid stuff, too.

There is an explosion of educational software for home and personal computers. But let's face it, educational software is expensive. There is no way the average family could afford to buy more than a small fraction of the products coming on the market. And, in addition to educational software, families want to buy other kinds of software, including software for home management and entertainment.

In the past, most families let the kids use the computer games and the educational programs, but they kept the kids off the word processor, the data base manager, the spreadsheet program, and the accounting program. After all, what use would a child—especially a younger child—have for these programs?

Productivity Tools For Kids

But what if families taught their children to use the software tools they had bought for their computer?

First, it would enlarge the number of programs available to the children and increase the number of activities they could do on the computer.

Second, there are hundreds of good educational programs on the market, but few of them teach work-related computer operations and skills. Using computer tools would get kids started doing "play" versions of the work-related activities they will eventually do at school or on the job, including word processing, record keeping, and computation.

Third, many parents buy educational programs for their children, then expect the kids to maintain their excitement about the programs without any parental support. The parents have no enthusiasm for the programs, so why should the children? Children—especially young children—get their cues from their parents. If their parents are excited about something, usually the kids will be excited, too.

For example, I am a writer, and I work at home. I am very intense about my writing and enjoy writing

on a computer.

It is no accident, therefore, that writing on a computer is a significant part of my children's casual play around the house. My five-year-old son Eric uses a computer to do "gobbledygook processing." He gets a great kick out of filling the screen with numbers and letters, then pushing a button to make his "work" come bursting out on a piece of paper, *ratt-a-tatt-tatt*, like a machine gun.

My eight-year-old daughter Catie uses a computer for all her written assignments from school. She also uses her computer to write up membership rules and cards for her tree-house club, and secret codes for club members.

We have lots of educational software around the house, but much of the time my children choose to ignore these costly programs and, instead, use the computers for word processing. And I never had to encourage either child to begin using the computer as a word processor, either. Instead, I think I "infected" them with my own enthusiasm for writing and computers.

Building A Kids' Work Station

What types of computer tools should you turn your kids loose on?

First, you should take software designer Tom Snyder's suggestion and get your kids started on any program that turns you on.

Second, pick programs that you already feel comfortable about yourself. If you are sitting in front of the computer struggling to master a new program, this is probably not the best time to have an energetic five-year-old bouncing around in your lap.

Third, look for activities that make sense to your child. Don't try to show them how to design a 40-page financial report on a word processor or spreadsheet, or how to retrieve canceled checks on the family data base. As fascinating as this might be for you, the kids are going to get bogged down. They will pick up on your enthusiasm, but they probably won't understand a word you say.

Instead, look for simple, scaled-down activities you can create that will interest your children.

Word processors, for example, are great for gobbledygook processing, letters to grandparents, pen pals, and distant friends. They are also super for secret codes, signs, greeting cards, and school work.

Computing For Families

Spreadsheets And Make-Believe

Spreadsheets are good for calculating how much a child has to save to be able to buy a toy or a doll. They can be used for charting a child's weight, allowance, chores, height, school grades, and achievements, such as number of hits in a row or number of days in a row that the child wasn't put in the corner.

Spreadsheets are wonderful, too, for make-believe activities: What if you grew a foot each day, how tall would you be at the end of the month? What if you gained ten pounds each day, how much would you weigh next year? What if you ate 14 bananas each day, how soon would you have eaten a thousand bananas? What if you had a million dollars to spend, what would you spend it on?

Record-keeping programs can be good for storing a child's baseball card records, dolls and doll names, imaginary friends, and special events, much like an electronic baby book.

The key to all these activities is that first and foremost they must be *fun*. If you are going to take the time to introduce your child to a computer tool that you like, try to make the introduction gentle and playful. Don't treat the program like medicine: "It may taste yucky, but it's good for you." Instead, think of why *you* are excited about the program. Then translate your childlike enthusiasm into activities for your child.

And remember, keep it simple. Otherwise, you will probably tax both your child's attention span and your good humor.

Family Tools

An example of a tool that can be fun for the whole family to use is the *ThinkTank* program from Living Videotext, Inc. (1000 Elwell Court, Suite 232, Palo Alto, CA 94303).

ThinkTank costs \$195. It runs on the IBM PC, PC-XT, and true PC-compatible computers (but not the PCjr). It requires at least one disk drive and 256K RAM.

ThinkTank is an *outline processor*. You use it to create an outline of a talk you want to give or a report or letter you need to write. You can also use it to create shopping lists, lists of things to do, or inventories of household items. Once you have created your list, you can easily store it on disk or print it.

There are many things I like about *ThinkTank*

which make it a computer tool for the whole family. For example, it is easy to use. You sit down at the computer, type "TANK," and you are up and running. If you were working on an outline during your last session, the program automatically positions you at the bottom of that outline so you can continue your work.

The program is entirely menu-driven so you don't need to remember any commands. However, as you begin to recall certain commands, you can zip around in your outline with just a couple of keystrokes.

Creating an outline is simple. You just type in an item and hit Enter. If you want the next item to be subsidiary to the item immediately above it, you just press the right-arrow cursor key. If you want the item to be more important than the item above it, you press the left-arrow cursor key.

You never have to remember to assign Roman numerals, numbers with decimal points, and all those other combinations of letters and numbers, like I-A-4-b-(1)-(c), which usually precede categories in an outline. Instead, *ThinkTank* takes care of assigning numbers for you. And, if you are like me and find the numbers messy and distracting, you can do away with them entirely. In any case, you never see them on the screen.

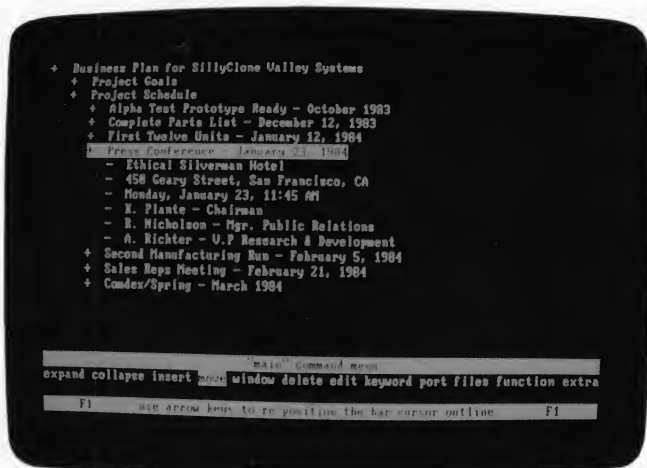
Opening Outline Windows

Manipulating the outline is also easy. If a category has subcategories, it is preceded by a plus sign. If it has no subcategories, it is preceded by a minus sign.

You can open or close your outline just like opening or closing a window. The first item in the outline becomes the title. You can move a cursor up to that item to highlight it in inverse video. Then, by pressing the minus key, you can close the outline window so the only thing that shows is the title.

This is a lot of fun. And it can be repeated for any other item, category, or heading in the outline. You just press the minus key and all the subcategories in the outline window disappear. You have the title of the window, but you don't have to look at all the details inside.

Later, when you need to look at those details, you just position the cursor over the item and press the plus key. Immediately, the window opens and all the subcategories (one level down) appear. If you want all the details to show *at all levels*, you just press Enter.



A sample outline created with ThinkTank.

A Family Idea Processor

Living Videotext calls *ThinkTank* "the first idea processor," and I'm inclined to agree. When I'm thinking of something new and trying to get my ideas down on paper, I need help. *ThinkTank* gives me that help.

When I first try to sketch out my ideas, I usually begin listing them. *ThinkTank* makes this an easy, straightforward process.

Next, I realize some of my ideas have subsidiary components. With *ThinkTank*, you just press the cursor keys and the Ins (insert) key, and you can add new ideas—at any level—in the middle of your outline.

I also have occasional ideas that are more narrative and don't conveniently fit into the outline format. *ThinkTank* takes care of this with the "Paragraph" feature. At any point in the outline you can insert a paragraph. The paragraph is really another window—a window into a word processor. You enter the paragraph just like you were entering regular text with a word processor. You aren't limited to just one paragraph. In fact, you can enter as much text as you like. Then you can go back and edit what you've written.

In the past, after I had entered several ideas and paragraphs into my outline, I began to get confused. I

saw all the details, but I forgot the original thread and thrust of my ideas. In other words, I saw all the trees and forgot about the forest.

This is where *ThinkTank* is especially handy. Now when I create a new outline, if I see too many details, I just shut some windows. That is, I just zip around the outline pressing the minus key and rolling up the details in each category. Now all I see on the screen are the major categories. This helps me concentrate on the main topics and not get bogged down in the details.

Also, if I want to change the order of my thoughts, I can use the Move command and shift entire categories (with all their subsidiary categories and items) in just a couple of keystrokes. With the Merge command, I can join paragraphs (sections of text) which appear under different headings. The Alpha command sorts the entire list of categories or items alphabetically. And the Xchange command replaces any sequence of characters with another sequence.

Software With Charm

Last, but not least, the *ThinkTank* program has *charm*—a collection of minor features that make the program more attractive and enjoyable to use. For example, it has an Undo command to let you rescue some category you just deleted. When you are searching for a particular outline, a Browse feature lets you scan through the outline titles, which is easier than relying on the eight-character filenames. You can also move your outline window to the right or left to center it according to your tastes and for ease of use.

ThinkTank is especially charming when you drop into deeper and deeper subcategories. If you were using paper, you would eventually fall off the paper's right side because you had to indent your outline at each new level. But *ThinkTank* solves this problem for you. As you descend deeper and deeper into detail, it scrolls the screen to the left, so that you always start each new category line at the left margin of the screen. This leaves you the entire screen on which to type your category label. Then, with a single keystroke, you can scroll the outline to the right and see all the categories in their entirety.

Another charming feature is the program's memory. It seems to remember lots of little house-keeping details that free you to focus on the content of your outline and not the mechanics. For example,

Computing For Families

it remembers such things as which outline windows you had open, closed, or partly open when you used the outline last; and which disk drive (A or B) the outline was stored on, and which it should be saved to.

The program even makes neat little sound effects as it replaces a character string, opens a category window, or prints its header line at the beginning of a new session. You can actually hear each item splashing onto the screen or flipping through the computer's memory as *ThinkTank* prints a list, performs a sort, or searches an outline. You might think this is superfluous, but I find it very satisfying. It makes me feel powerful. I feel like the machine is working very hard for me, doing zillions of things in just a few seconds; and it makes me feel secure that all the little details are being taken care of. I can hear all my ducks being lined up in a row. Plunk! Plunk! Plunk! Every last one.

ThinkTank For Kids

All of these features make *ThinkTank* a powerful, easy-to-use tool for adults and kids.

As soon as I got comfortable with *ThinkTank* (after my second outline), I called my son Eric into the room, sat him on my lap, and we put *ThinkTank* through its paces.

The first thing I did was let Eric zoom the bar (heading) cursor through the outline, and open and close the outline windows.

That was fun, but we quickly got bored just zipping about. That's when we really went to work.

The first thing we played was "Peek-a-Boo!" a game we invented while poking around. To play Peek-a-Boo! we created several categories called HAT #1, HAT #2, HAT #3, etc. Then we placed things "underneath" the hats by adding subcategories. We put a bunny rabbit under one hat, a chick under another hat, a gold coin under a third, and a bubblegum ball under another. We hid the items by pressing the minus key and closing the outline windows.

Sometimes I moved the hidden objects to new hats. Sometimes I didn't. Then it was up to Eric to guess which item was under which hat. After he guessed, he got to pick up the hat (by pressing the plus key). When he picked up the hat, the object underneath magically appeared. Eric quickly learned how to recognize the words "CHICK," "BUBBLEGUM," etc.). And each time they appeared, we would shout "Peek-a-Boo!"

Eric's Castle

Eric and I figured out lots of other games we could play with *ThinkTank*. Here are a couple:

"Find Eric!" Eric would type a lot of gobbledygook categories and words while I closed my eyes. While he was typing, he would hide his name inside one of the categories. Then I would use the Search command to find his name. Then it would be my turn to hide my name, and Eric would have to find it.

One variation of this game is to hide things inside related categories. For example, Eric would have one guess to decide whether his name would be inside the BOY category, the DRAGON category, or the PUDDLE category. In this way we practiced the grouping of like objects under a single heading.

"Eric's Castle." Eric pretended he was king and that he owned a make-believe castle. He created an outline called CASTLE under which he put different room headings, such as DUNGEON, KITCHEN, GAME ROOM, BATH ROOM, TREASURE ROOM, and SWIMMING POOL. Into each room he put toys, furniture, food, and other things appropriate for that room. Many of the things Eric and I made up, such as the swords, roasted boar, 12-tier king's birthday cake, coats of mail, and sea monster (for the swimming pool). But many of the things came from Eric's own bedroom, including his collection of baseball cards, stickers, pet rocks, chips, and robots, and his beloved blanket and ratty pillow. So what we were creating was an inventory of Eric's possessions—both imaginary and real.

After we put the objects in the rooms, we started adding creatures and characters. We made up stories about the castle, solved murders by tracking down clues in the different rooms, conducted court, jousted (in the game room), captured evil-doers and tossed them into the dungeon, threw an all-night party, and drank so much ale (Eric pronounces it "L") and ate so much birthday cake that we felt sick. We even managed to accumulate a sizable fortune that we put into the treasure room.

Where do we go from here?

Now I've got Eric on *Multiplan* (a spreadsheet program from Microsoft) trying to calculate how many baseball stickers he could buy for each of his stuffed animals with his treasure—if he could get different discount rates on the baseball cards from the local 7-Eleven. □

Computing For Families

FRED D'IGNAZIO, ASSOCIATE EDITOR

It was 6:30 in the morning. I dragged two heavy suitcases and a briefcase up to the security checkpoint at the Roanoke (Virginia) Airport.

"It's our little man!" exclaimed one of the female guards. "What kind of computers do you have today?"

"They're all computers," I said, puffing. "The suitcases are full of software, and my briefcase has a computer inside. Nothing can go through the machine. You'll have to hand-check all of it."

"Where are you going this time?" one of the women asked as she searched through the stacks of floppy disks stuffed in my wife's suitcase.

"To *Good Morning America*," I said, watching their eyes widen. "I'm going to show these computers to millions of families!"

A Troupe Of Dancing Bears

I managed to get all my computers to the *Good Morning America* studios on Broadway in New York. Then I spent the next day tracking down more computers and setting them up. When I was finished, there were six computers in one tiny office. All of the computers were on, running what I thought was the best software for the show. One computer was playing jazz music. One computer was displaying a picture of a happy face. Another computer kept saying, "See the bees. Count the bees. One, two, three. Count the bees." Still another computer was playing a train game, and a steam engine came through a tunnel, wheezing and whooshing. And yet another computer was showing an animated cartoon of a dog knocking over a trash can. Each time the dog slid into the trash can, there was a loud crash.

Two more computers were relatively quiet. One was humming away, showing a computerized spreadsheet. The other was displaying a word processing program with a fan letter to the show's cohost Joan Lunden (from me).

People from *Good Morning America* kept buzzing in and out of the office, looking at and listening to the computers. Sometimes they even sat down and played with the computers. Having the computers at the *Good Morning America* offices seemed to be such a novelty that it made me feel as if I had brought along a troupe of dancing bears. People were fascinated with the computers and loved to watch them perform.

From Videogames To Dinosaurs

Good Morning America assigned a writer to work with me to produce the computer segment for the show. They wanted the segment to focus on software and run under five minutes maximum.

The writer, Jerry Tully, watched patiently as I explained how the four-dozen software packages I brought worked. I told him how most software these days could be grouped into just a few categories:

1. Entertainment—board games, videogames.
2. Education—learning games, drills.
3. Productivity—word processing, filing, etc.
4. Hands-On—teaching about the computer.
5. Lifestyle/Leisure—hobbies, exercises, cooking.
6. Telecommunications—calling other computers on the phone.
7. Creativity Tools—music, art, etc.

I told Tully that most computer programs on the market a couple of years ago were either shoot-em-up videogames or complicated business programs. But, today, I said, software companies were branching out into lots of new areas. I showed him the *Moviemaker* program from Interactive Picture Systems which lets people create their own animated graphics. I showed him Waveform's *MusiCalc*, which turns a computer into an electronic synthesizer and allows people to compose their own music. I also showed him *Dino-*



saur Dig (from CBS Software and designed by NeoSoft Inc.), which runs on the Apple IIe and will soon be on the PCjr. *Dinosaur Dig* comes with a plastic overlay for the computer's keyboard. The overlay is brightly colored, and the keys are specially labeled with the names of dinosaurs. One side of the disk is a combination of an electronic textbook on dinosaurs and a movie, complete with animated dinosaurs running across the screen. The other side is full of exciting dinosaur games.

When Learning Looks Like Play

Tully liked the dinosaur game because it appealed to him as serious learning even though it was colorful and unusual. However, he was less impressed with many of my other favorite programs because they looked too much like videogames to be taken seriously by the average TV viewer.

I explained that the trend in learning programs was to make learning fun, both for children and adults. Because of this goal, many of the programs had a gamelike appearance.

Tully understood this, but felt that since the segment on computers was so short, there would not be enough time to make this point on the air. People watching the show would confuse learning games with videogames.

After arguing with him for some time, I finally agreed with him. I had recently experienced the same

reaction at my children's elementary school. I took several types of learning games to their school as show-and-tell software. The children enjoyed the programs and wanted to use them, but many of the teachers were not impressed. At the end of the presentation the principal came up to me and said, "The teachers think those programs are nice, but they want to know if you have any programs that really teach something."

The \$500 Pencil

The only learning program we showed on *Good Morning America* was *Dinosaur Dig*. The other two programs were "productivity" tools. Tully and I agreed most people are still asking themselves, "Why should I buy a home computer?" or "What can I do on a home computer?" Productivity programs let you do work on a computer. They don't look childish. They don't resemble videogames. They are serious stuff.

However, I made the point to Tully that most productivity programs in the past—including word processing and filing programs—were difficult, cumbersome, and complicated. In the home, at least, you were usually better off ignoring the computer and using a pencil and a piece of paper instead.

I said the question everyone should ask themselves before they do anything on the computer is: "Do I really need a computer to do this?" If people

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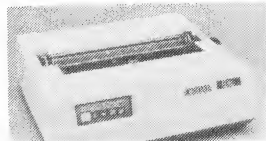
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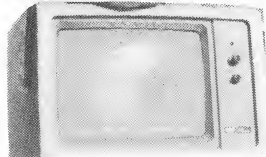
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don't ask themselves this question, they might end up using the computer as a \$500 pencil (or even a \$2000 pencil).

When Work Looks Like Play

Tully and I reviewed several productivity programs before we finally hit upon the two that we used on the show. We ended up using the *HomeWord* word processor from Sierra On-Line on the PCjr, and the *MultiPlan* spreadsheet on the Apple Macintosh.

Interestingly, we chose these programs because they were obviously serious, work-related tools, but they also looked fun and easy to use. *HomeWord* (see my review in the March 1984 issue of *COMPUTE!*'s PC & PCjr Magazine) has little pictures at the bottom of the screen called icons. The icons represent word processing functions. Instead of having to memorize computer codes, as in older word processing programs, all you have to do is position a giant blinking cursor on one of the icons. For example, if you want to print your document, you just point the cursor at the icon of a printer.

With the icons around, somehow word processing just doesn't look so hard or so dreary. In fact, *HomeWord* so fascinated Tully that he spent all his free time while I was there playing with the program, endlessly writing and rewriting little notes and letters to himself on the computer.

The other program we chose, Microsoft's *MultiPlan*, runs on most computers. I set up a family budget using *MultiPlan*. On *Good Morning America*, I showed Joan Lunden how the entire budget could be affected if, for example, the family car broke down and shot the Miscellaneous category for the month from \$75 up to \$300. It was impressive to watch the changes ripple through several months of the budget.

Of course, it is not necessary for a family to use a computerized spreadsheet to do their budget. They could easily get by with pencil and paper. But a spreadsheet does enable a family to ask "What if?" questions about different expenses and to see, instantly, the kind of impact they have on the budget.

Even more importantly, a spreadsheet can make budgeting less tedious and more fun. It's fascinating to watch all the budget figures change instantly, right before your eyes. It makes you adopt an experimental, even a playful, approach toward budget planning. It makes you curious to see what kind of effect different changes will have, and what will happen if you create budget formulas with different assumptions (for instance, the price of gas continues to rise; or the price of food decreases as the price of

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Computing For Families

entertainment rises). You begin seeing relationships among your family's activities that you never knew existed. And the spreadsheet program encourages you to play with those relationships to see how much you and your family have to spend each month in different budget categories.

Whizzing Through Software

The day of the taping finally arrived. I woke up at 4:30 a.m. A limousine picked me up and took me to the *Good Morning America* studio at 5:45 a.m. I spent the next three hours supervising the stage crew, which unpacked the computers and set them up for the show.

At 9 a.m. Joan Lunden came over to the computers and greeted me. She and I rehearsed the spot in front of the entire studio crew and the producers.

I had been working for a month preparing the spot. I had brought dozens of software packages. I had set up six computers with four more computers as backups. I wanted to talk about the world's first software convention, SoftCon, down in New Orleans

just the week before. I wanted to talk about the explosion in the software industry, from only a few companies to more than 3000 firms making over 10,000 programs. I wanted to tell about the new GAZETTE DISK in which people get all the programs in each monthly issue for about the cost of a disk (about \$6). I wanted to talk about book-disk packages and about the new software vending machines which are going into convenience stores such as 7-11.

I wanted to talk about all these things, but I knew I couldn't. Tully had already edited me down to a scant 5½ minutes.

And when I began rehearsing with Joan, she thought I was taking too much time, so I edited myself (in front of all those people and bright lights) down another minute and ten seconds.

When we finally taped the spot, we used only three computers, three pieces of software, and the whole segment lasted only 4 minutes and 20 seconds.

But one thing's for sure—we didn't waste a single second.□

Computing For Families

FRED D'IGNAZIO

In his next couple of columns, Fred D'Ignazio will discuss the typical problems faced when shopping for home computer software—and suggest some solutions.

Recently I appeared on ABC-TV's "Good Morning America" program to advise consumers on computer software (see my column last month).

I discussed software with the show's co-host, Joan Lunden, and said consumers could learn a lot about software by carefully examining the package that software comes in.

The first thing you should look for on the package is a *brief description* of what the software does, what kind of machine it runs on, and what age groups it is suitable for.

The second thing you should try to find are *screen shots*—pictures of the way the software actually looks on the computer's screen. This way you won't be misled by fancy, colorful illustrations on the package.

Third, you should open the package and look at the *manual* which accompanies the software. If the manual is long and technical, watch out. This might mean the software is difficult to use. On the other hand, if the manual is well-illustrated, brief, and clearly written, this probably means the software is easy to use and that it may even teach you about itself.

Next, you should look for a *warranty card* in the software package. This is a new standard. Warranties are anywhere from 30 to 90 days.

You should also look for a *hot-line number* you can call if you can't figure out some part of the program and you run into a dead end. A hot-line

number can save a lot of frustration.

Last, you should look for a *replacement disk* offer. If, for example, a six-year-old spills apple juice on a computer disk, you'll need some way to replace the disk. And you won't want to pay the original, high price. Many companies are beginning to offer replacement disks at a fraction of the original cost.

The Consumer's Point Of View

I was advising consumers to be aggressive about examining software packages because I had just completed a two-week survey of stores which sell computer software, and I knew how difficult it is for the average person to shop for software.

I had conducted the survey to prepare for a speech in New Orleans at Softcon, the world's first major software show. The title of my speech was "A Visit to the Wasteland." This title described my two weeks' experiences at stores which sell computer software. The stores included major department stores and discount houses such as K-mart, Brendle's, Hills, and Toys 'R Us, and bookstores such as Waldenbooks and B. Dalton.

Jeffrey Tate, in a recent issue of *Software Letter*, wrote, "At one end of the software industry there are millions of new computer enthusiasts eager to buy the 'right' software; at the other end are publishers eager to provide it. In the middle is a condition of chronic bewilderment."

This is just what I found.

The only outlets which allowed consumers to browse through software and test it on computers were computer stores and Brendle's. Unfortunately, most people do not shop at computer stores. In fact, most people are afraid of computer stores. They prefer to do their computer shopping in more familiar surroundings—at discount stores, bookstores, and department stores.

However, at the discount stores and department



stores (including Brendle's), all the software is locked up inside glass cabinets. To browse through the software you must overcome at least three obstacles. First, you must find a salesperson who can unlock the cabinet. Second, you have to get inside the software package (it is usually shrink-wrapped in plastic). Third, you need to find an idle computer.

In most discount houses there are no salespersons within sight and no computers. In bookstores there are no computers, and most software is wrapped in plastic so you can't open the packages and look at the manuals and accompanying materials.

Occasionally the software is displayed on an open pegboard rack, hanging from a hook. Then you can inspect the package and even get inside.

Unfortunately, even at stores where the software packages were within reach, I discovered several problems. First, there usually are no computers which are plugged in and available for testing the software you want to see. Second, the software pack-

ages and their contents rarely answer all of a customer's questions. Third, the sales clerks sometimes have no idea what they are selling. Fourth, the computer section of the store is often extremely unattractive. The software is packaged in undifferentiated, cold, metallic gray boxes, or illustrated in bizarre colors or garish graphics which reflect some *Dungeons & Dragons* or space wars theme. Furthermore, the computer section is often in disarray. Packages are scattered everywhere, upended, half-opened, and disheveled. Store clerks in the discount stores told me that software theft is a major problem (hence the locked glass cabinets).

The Software Explosion

Most retailers do not know how to sell software. This lack of understanding stems from the explosive growth and development of the software industry.

Five years ago there was no "software industry." Yet now, in mid-1984, 3000 companies are producing

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over 10,000 programs.

More than \$2 billion of programs were sold in 1983. Experts predict that, by 1987, sales will reach \$11 billion. By then the software industry will be larger than the book industry.

The average retailer is beginning to understand that computers can't run without software. But he is not exactly sure what software does.

The retailer's knowledge about software is lagging behind software's swift evolution. A couple years ago, most programs were either shoot-'em-up video games or complicated scientific and business tools. Today software has spun off into dozens of new directions. There are agricultural programs, library programs, programs for cooking, gardening, aerobics, self-expression, and creativity. There are programs to suit each person's lifestyle, leisure interests, and hobbies. And this is just the beginning. Ultimately, software will mirror all forms of human activity and endeavor. Unfortunately, for the moment, retailers are aware only of games and workhorse programs.

The Software Grocery Store

Retailers' image of software is reflected in the way they merchandise software in their stores. The software section is either formal and high-tech—like an expensive stereo shop—or it is like a messy toy store with displays obviously oriented toward boys and men.

In my speech in New Orleans I called for a *feminization* of software merchandising by software retailers. I said there was no reason software displays have to be so sterile, so ugly, so uniform, and so male-stereotyped. After all, software has the ability to mirror life, so software displays should be just as gritty, dashing, and diverse as life, and just as full of fashion, flavor, and style.

For example, why not have:

- *Software boutiques* which sell pastel-colored packages filled with the latest in upscale "designer software."

- *Software grocery stores* that fill customers' senses with colorful visual displays, and scented and textured packages—just like a visit to the fruit and vegetables counters at a nice grocery store.

- *Fast-food software stores* which treat software as a low-priced consumable product—with special sales, marked-down products, bonuses, and treats.

- *Computer appliance stores* which sell bundled hardware-software "appliances." The stores don't sell bewildering, general-purpose computers. They sell special-purpose appliances that customers can understand.

- *Software entertainment stores* that sell software the way record stores sell records—with lots of big posters of sexy software artists and illustrations of the top-selling games. "Hot 40" charts should prominently point out the software bestsellers.

- *Software hobby stores* that sell special-interest software to help you be a better cook, gardener, parent, stamp collector, etc. This store would be a great place to feature the new "do-it-yourself" software *builder kits* that enable you to compose music on your computer, paint pictures, create animated cartoons, and make your own video games, run your own model railroad, and build your own pinball machines.

- *Software fabric stores* that feature big catalogs like the sewing catalogs in fabric stores. The catalogs would be organized by computer and subject and would let you pick the type of software just right for you and your family.

- *Software Toy Stores* featuring the best new educational software toys for kids and their parents.

Obviously, no store—especially no discount store—could afford to implement all of these ideas, or even any single idea completely. But the displays in the store could be handled using the above ideas as *themes*.

This approach would help customers several ways. It would make software shopping a more pleasurable, comfortable, and sensual experience. It would better inform customers and increase the chance that they would be satisfied with what they had bought. It would also help the retailer. Happier customers would probably buy more on each visit, return to the store more often, require less help making each purchase and return purchased software less often.

Back From The Wasteland

Next month we'll take a look at how some retailers are beginning to handle software differently and more imaginatively. Also, we'll see how IBM is using software development, packaging, and post-purchase "hand-holding" to give dealers and customers more support. □

Computing For Families

FRED D'IGNAZIO, ASSOCIATE EDITOR

In last month's column we discussed how difficult it is for the average consumer to shop for software. This month we will look at the different approaches employed by two new chains of software stores.

Software Cities are a new chain of software-only franchise stores that have recently opened in San Juan, Puerto Rico; London, England; Birmingham, Alabama, and in 100 other cities. Most of the stores are still located in the New York and New Jersey area, near the corporate headquarters in Teaneck, New Jersey, but there are plans for new stores all over the U.S. and in many other countries.

A Software City is not exactly a software-only store. It also sells other *computerware*, including supplies, monitors, and printers. However, most of each store's business is in computer software.

According to Sharon Murphree, manager of the Software City at East Wood Mall in Birmingham, her store resembles a Hallmark card shop, since much of the software is tucked into card racks. Additional software is arranged on hooks fastened onto pegboards. Both methods allow customers to pick up the software packages and "browse."

Murphree says each Software City store is managed independently. This gives her, as manager, the opportunity to buy any kind of software her customers need and to buy from any software publisher or supplier. Also, it gives her the freedom to decorate and arrange the store anyway she wants.

Murphree's store also carries a large number of magazines and books about computers. In fact, in some ways the place is run like a bookstore. If a customer wants a particular software package that is not in stock, Murphree will special-order it.

Software Cities are discount stores offering software at prices comparable to those at places like K mart and Toys 'R' Us. But computer products are Software City's only business.

"Our sales force is familiar with all the programs we carry," says Murphree. "They read the best magazines. They call software companies for more information about interesting new packages. We also look at best-seller lists from [the software distributors]

Softsel and Ingram. Customers also recommend packages. We learn about who are the reputable companies that we can trust."

I asked Murphree if she had problems with customers returning software. "We don't give refunds," she said. "But don't get me wrong. I have a people-oriented background, and we are a people-oriented store. We don't refund a piece of software if the person just doesn't like it. That would be like selling a person a book and returning their money if they didn't like the book."

Live Birds And Mammoth Boulders

A thousand new computer stores opened between June and December last year. By January 1984 there were 3152 computer stores in the United States. By 1989, according to Future Computing, Inc., there will be more than 6000 stores.

But not all of them will be alike. Bernie Tessler has opened a chain of computer stores unlike anything you've ever seen—except at the zoo. Each of Tessler's Enchanted Village stores consists of 5000 square feet with more than 80 giant boulders arranged like mountains, in what Tessler calls "a preworld environment."

Passageways wind between the boulders and underneath a tall glass archway. Screams and squawks come from the archway, which is really an aviary—a "natural" environment for several live birds.

Nestled among the boulders are ten computer stations. People purchase 50-cent tokens to use the computers for ten minutes. When the ten minutes are up, the computer monitor automatically darkens, but the program is still running on the computer. This means that a person can keep inserting new tokens and using the same software for a store-set limit of two hours. Tessler says many people come to the store and do their computer work on his machines. They can purchase programs from the store or bring their own programs.

"We have over 400 software titles in our store," he says. "We have no gobble-em-up or shoot-em-up videogames. Instead, we have educational, strategy, and sports games. People know we have no arcade games. We sell only quality programs at competitive prices. People know that everything in the store has been reviewed beforehand. If it's not good, we don't

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carry it."

In the corner of each Enchanted Village is a 50-person theater. Seven theater programs are held each day—all of them live—on such subjects as storytelling, magic, science, and mime. Three of the seven programs each day are on computers. The store also holds frequent computer workshops in the theater "for mommies, daddies, families, children, business people, and teachers," says Tessler.

"Customer training is the hallmark of our stores. We carry the most popular kinds of computers, but we don't let any customer out of the store before we open up the package and show them how to use their computer. And if that's not enough, we make house calls. We go to the customer's home if they run into problems after they leave the store."

'ComputerLand For Families'?

"I used to be a teacher," explains Tessler. "But I got very frustrated with the system. No one was happy. Kids hated the system, and so did the teachers. That's when I decided to become an entrepreneur and create computer-resource stores where real learning could take place. I wanted to create *edutainment* centers, places where learning could be fun."

Tessler's idea for resource centers eventually became his Enchanted Village stores. He has only two stores open now—in the Springfield Mall, in Fairfax, Virginia, and in South Hill Village, in Pittsburgh. But four more stores will be opening their doors by September; 15 more in 1985. "I am planning to open 100 stores within the next 3-5 years," he says. "By then Enchanted Villages will be the 'ComputerLand for families.'"

Computers and computer software actually account for only 65 percent of Tessler's business. The other third comes from the sale of books and educational toys. "Forty percent of our computer-related sales come from software, versus the typical 18 percent in an average computer store," says Tessler. "We want to create a standard. We have schools recommending software to teachers and parents because Enchanted Village's experts have approved it."

"We have an eight-page monthly newspaper, *The Enchanted Press*, that is written completely by our network of experts. We cover new software packages and recommend only the best new releases. We try to make our store as family-oriented and nonthreaten-

ing as possible. We assume that the average person entering the store arrives with no knowledge about computers.

"We work with school superintendents and PTAs. We bus children in, every day, on field trips from churches and schools. We even have a special program for Boy Scouts and Girl Scouts. We bring in a whole troop of scouts and, at a special rate, we let them use the computers for 45 minutes apiece. Then we reward them with a special 'Computer' merit badge."

Still No Software Browsing

Sharon Murphree of Birmingham's Software City says her staff encourages customers to open the software packages and read the manuals and other materials inside. But, with the exception of a lone Franklin Ace computer running Apple software, there are no demonstration computers at Software City. That means customers can't actually browse through the software itself.

At Software City, most software can be picked up and handled by customers. At the Enchanted Village, on the other hand, most software is behind a locked glass case. I asked Tessler if a salesperson would break open a software package and let a customer try it out on one of the store's computers. "Sure they can try it," he replied, "after they buy it. If a customer needs information about a software package, they can have their questions answered by the store's experts."

"Once the software is in the store we run demonstrations at our computers. Also, we work closely with several software publishers, including Spinnaker, Sierra On-Line, and The Learning Company. They send us special disks and tapes with samples of their programs to demonstrate on our computers. Sometimes we have to break open software packages, but we don't break open a lot. No one wants to buy a package that's been opened."

"Once a package has been purchased, we don't allow any returns. But this hasn't been a problem. Customers don't get to see the software before purchasing it, but they don't go home blind. We spend lots of time—sometimes hours—with each customer, giving them training right in the store."

"We are a resource center, but we are also a business. Sometimes there's a fine line between the two. We're learning as we go." □

Computing For Families

FRED D'IGNAZIO, ASSOCIATE EDITOR

In past columns we've examined some of the ways computer dealers can better help their customers. Now let's see what kind of attitude IBM itself is taking toward customers of the PCjr, its first product for the home.

Dealing With A New Market

When I recently visited IBM's Entry Systems Division in Boca Raton, Florida, the friendliest person I met was Walt Ward, manager of customer relations for IBM personal computers.

Of course, Ward is friendly because it's his job to be friendly. But I came away feeling that he is sincere. When he says he wants all PCjr customers to be happy, I think he really means it and will probably go out of his way to make it happen.

Ward is a model IBM'er. He eats, drinks, and breathes the IBM code of corporate ethics. When he told me the elements of this code—superior customer service, product excellence, and respect for the individual—his fervent enthusiasm reminded me of a Baptist preacher on the pulpit.

I asked Ward how this code would change now that IBM is dealing with individuals in the home—supposedly naive users—instead of sophisticated, million-dollar corporate customers. "The environment has changed," Ward replied, "but the philosophy hasn't. Our challenge is to bring our philosophy to customers in the home. This is, after all, a bold step for IBM. We realize that we are no longer dealing with trained computer experts. That is

why we feel we need to pay special attention to educating the new user.

"The first time we learned how big a job we had," Ward said, "was when one of our first customers called us with a problem with the PCjr. For a long time we couldn't figure out what he was trying to do. Finally, we realized that he was confusing his diskette drive latch with his on/off switch. When he went to turn off his computer, he bent the latch down (which locked the diskette in), but the computer wouldn't turn off. Finally, he grew so frustrated he broke the latch in two. And the computer still didn't turn off.

"Now," Ward continued, "we realize that this man was a normal first-time computer user. We can really appreciate how important it is to help him take his first steps on the computer and make those first steps good ones."

And what is IBM's idea of those first steps? "We want to see each PCjr that is purchased up and running as quickly as possible. We want to see first-time users productive and enthusiastic. Then their enthusiasm will be infectious. Happy users will convince other people that they can use our computers, too. This broadens our market."

The PCjr Helpline

One of IBM's new services for beginners to home computing is the IBM Helpline, a toll-free number (1-800-222-7257 or 1-800-222-PCjr) that new customers can call to get help from specialists at a Personal Computer Information Center. The Helpline operates weekdays from 10 a.m. to 7 p.m. (Eastern time). Toll-free help lines aren't a new idea—they were pioneered by other companies selling home

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computers, notably Atari, Inc. and Commodore. Now IBM, too, has recognized the value of personal contact for new owners of home computers.

"The Helpline is proving to be very successful," said Ward. "It is staggering for a person at home to call IBM, one of the world's largest companies, and get its attention and have it listen."

Although help lines have acquired a reputation for always being busy, Ward promises that the IBM Helpline will almost always be open. "We don't want to be self-defeating. We have spent a lot of money creating an Information Center. We have hired and trained customer-relations specialists. This would all go to waste if people couldn't get in. I won't tolerate that."

As soon as I got back home to Roanoke, Virginia, I called the Helpline. Sure enough, it rang only once before someone picked it up and answered, "Information Center."

Getting Help

The people you speak to when you call the Information Center are polite. They are trained to treat you like a human being, not like a machine.

What sort of questions can you ask? Ward says the IBM specialists are *not* there to answer deep technical questions or give you a free tutorial on your machine. "We can't afford to teach each new user how to write their own programs in BASIC or Pascal," he said, "but we can get them to the stage where they can start doing this on their own."

The Information Center specialists will, for example, help you get your "Sampler" diskette into the disk drive for the first time. They will discuss how you can apply the Sampler programs in your home. And if you're more experienced, they will even tell you how you can write software and sell it to IBM.

But the Information Center is there mostly as an escape hatch when the new user feels trapped. This is an extremely frustrating experience, and having a helpful, understanding person to talk to can be very valuable psychologically.

The Information Center specialists are also there to help *prospective* customers. They will direct callers to IBM dealers, quote prices, and estimate how long it will take to deliver a new computer. They can also tell callers how to become IBM dealers themselves.

Of course, new owners have a good chance of setting up a computer on their own, without having to call their dealer or the IBM Information Center.

I tested this when I got my first PCjr. I called in a college student, Mary Catherine ("M.C.") Andrews, who had neither seen a PCjr before nor had ever set up a personal computer. I pushed the computer boxes in M.C.'s direction, then left the room.

An hour and a half later she had set up the entire computer. She had the computer plugged in and had loaded the Sampler disk into the disk drive and had the "Clock" program running.

What's more, M.C. was enthusiastic about the computer, wanted to do more with it, and was extremely proud of her accomplishment.

Getting Started With The PCjr

How had M.C. set up the computer so easily? She described her steps to me:

First, she opened the boxes and took out the different parts of the computer (each part was in a smaller box).

Second, she took the plum-colored *Guide to Operations* that comes with the computer, and, following its instructions, she unboxed the computer's cables, system unit, and the keyboard, and plugged them into each other. This was easy because of the pictures in the *Guide* and because each

connection on the back of the computer is labeled (for example, P for power and K for keyboard).

Third, she plugged the computer into a TV set and turned it on. She followed the *Guide to Operations* and played the computer's built-in game, *Keyboard Adventure*. The PCjr is the first computer to come with a built-in educational game. You don't need to buy any software—you just turn on the computer and press the Escape (Esc) key in the upper-left corner. The game introduces you to a little character known as "P.C."—the same character you meet in the *Guide to Operations*. You can control P.C.'s movements around the screen using the cursor arrow keys. Also, as you type letters, P.C. grabs the letter keys and puts each one in its proper keyboard location. If you type all the letters, P.C. builds an entire keyboard on the screen. For newcomers, the game is fun, and it helps you become more familiar and comfortable with the keyboard.

M.C. got tired playing *Keyboard Adventure*, so she began reading the *Guide to Operations*. Then she discovered the Sampler diskette and, following the instructions enclosed with it, she pushed the disk into the disk drive. A minute later, PCjr had turned into a large alarm clock.

That's when I walked in.

Some time later, M.C. left for the day, so I sat down with the computer. In two hours I managed to thumb my way through the *Guide to Operations*. Then I played around with the Sampler diskette. I discovered it contains an introductory program, "Hello," to get you started and 11 other programs, including:

- Shopping list
- Name & address file
- Simple typewriter
- Word game
- Alarm clock

- Monthly expense notebook
- Recipe file
- Checkbook balancing program
- Telephone connector program
- Tile (numbers) game
- Home-loan calculator

I checked out each of these programs and found them, for starters, to be completely serviceable. As IBM says, in fine print, the programs are "intended to demonstrate some functions PCjr is capable of performing." But the programs are "not intended to be a substitute for application programs which the buyer may choose to acquire independently." As a result, IBM doesn't offer any warranties with the Sampler (although it will replace the Sampler diskette if it is defective).

Need More Help?

The combination of *Keyboard Adventure*, the Sampler diskette, and the *Guide to Operations* cover lots of ground for a newcomer to computing.

But what if you still run into problems?

What if you can't figure out what to do on your own? What if your dealer can't help, and when you call the Information Center on the Helpline, they can't help either?

Then you can get in touch with Walt Ward personally. Every PCjr comes with a letter from Ward (look inside the Sampler diskette case). If you run into problems that you, the dealer, and the Information Center can't solve, then call 1-800-222-PCjr and ask for Ward himself.

You can also write to him at this address:

Walton L. Ward
Manager, Customer Relations
IBM Personal Computer Entry Systems
P.O. Box 2910
Delray Beach, FL 33444



Can Toddlers Tackle

FRED D'IGNAZIO, ASSOCIATE EDITOR

When I first got into computers in 1974, they were the tools of military generals, large corporations, and scientific laboratories. I worked on a mammoth super-computer in the basement of the Pentagon, across the Potomac from Washington, D.C.

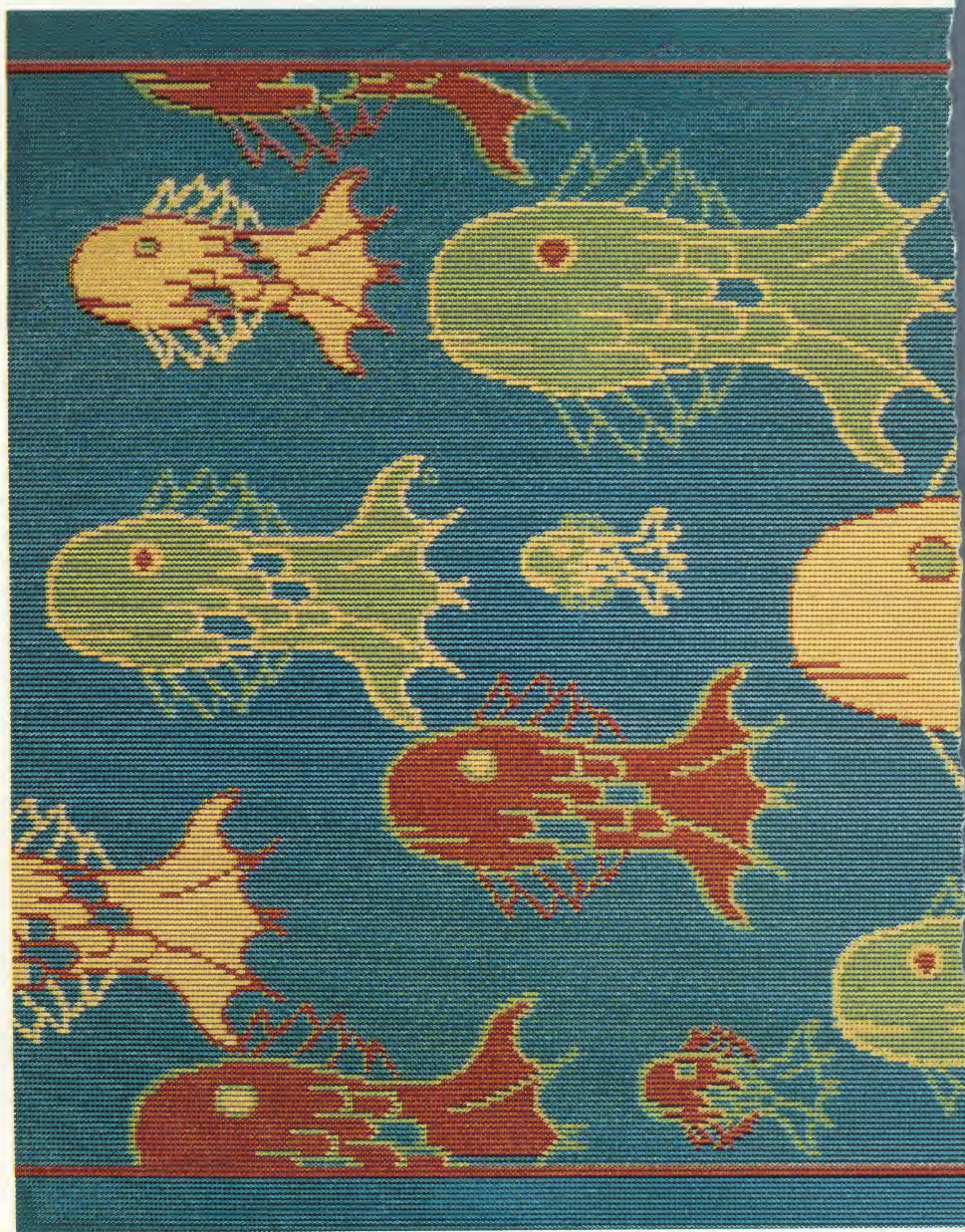
I spent four months awaiting clearance for a top secret classification before I could put my fingers on the computer's keyboard for the first time. Armed soldiers guarded the doors into the room which contained keyboards and video screens. We never got to see the real computer itself. And we never got to see the real information that flashed through the computer. It was all classified.

That was a decade ago. A lot has changed in ten years.

Today we have computers in more than eight million homes and classrooms. The computers fit on top of a desk or table. Everyone can have a crack at the computer, including the little people we call toddlers.


Toddlers have access to computers, but that doesn't necessarily mean they can do something worthwhile on a computer, or that they *ought* to use a computer.

Experts predict that by 1990





Computers ?



between 14 million and 35 million American homes will have computers. That means tens of millions of kids will have access to a computer. Of those kids, millions will be toddlers. The question is: Can toddlers tackle computers? And if they can, should they?

At the Better Baby Institute in Philadelphia, educators believe that all normal, healthy children are born with the potential to be as brilliant as Leonardo da Vinci. They conduct training sessions with expectant parents and new parents to enable them to help their children reach that potential. They also run courses for the kids. Many of the children in the courses are only a few weeks old; most are under five.

New research into early child development suggests that babies are more alert and intelligent than was previously thought. This encourages educators and parents to begin teaching their children almost as soon as they have emerged from the womb.

One of the most popular techniques parents use is flash cards. The flash cards have words and

pictures to teach children reading, writing, logic, and counting. Using techniques developed at the Better Baby Institute, many children have learned one or more of these skills before their third birthday.

Parents and teachers started with flash cards made of paper. But now, at the Better Baby Institute and at toddler "computer camps" such as Tiny Bytes in California, they have begun using computer flash cards. The computer is an ideal "flash card machine." It can be programmed to tirelessly show a series of cards to a young child. When it gets to the bottom of the pile, it jumps back to the top and starts all over again. The program can be timed to be as slow or patient as necessary. It can gradually increase its speed and the difficulty of the cards as the child advances.

Young children seem to have an aptitude for early formal instruction, and they have shown a definite aptitude for computers.

Parents who encourage their children to begin using computers at an early age claim that they are thinking of the children's future.

The parents are right. The world is getting more and more computerized, and, according to an

Delta Drawing by Spinnaker Software (on preceding pages).

IBM study, by 1990 more than 80 percent of all working adults will use a computer as an integral part of their job.

However, there are many pitfalls when introducing children to computers and to formal learning at a young age.

To begin with, according to Fred Hechinger, education editor of *The New York Times*, the skills which people need to use computers today will be obsolete by the time today's toddlers enter the job market.

If we loosely define a toddler as a child from age one to age four and assume the toddler will attend college, the earliest he or she will enter the job market is the year 2001. Given the swift pace of computer technology, training toddlers how to use twentieth-century computers will definitely not prepare them to use computers of the twenty-first century.

This argument must be qualified by a look at the way toddlers are being trained. Many eager parents are showing a six-month-old flash cards with computer words like RAM, ROM, kilobyte, and CPU, and trying to teach their youngsters how to program in BASIC or Logo—two popular computer languages—even before they are potty-trained. (This reminds me of a cartoon that recently appeared in *The Wall Street Journal*. A little child and his mother are in the midst of a fight. The mother has her arms folded. She says, "That's final, Opus. You can't have a computer until you're toilet trained.")

There are two disadvantages to the "formal training" approach. First, the parents run the risk of permanently turning their children off to computers.



The KoalaPad from Kaola Technologies.

Let's take a closer look at this risk.

With the new "happy face" programs for toddlers, even the youngest children take to computers naturally. Computers give them immediate rewards: praise, colorful cartoon figures, sound effects, and music. They make little children feel important, competent, and in charge. On their own, children will approach computers and use them the way they might use a doll, a set of building blocks, or a coloring book. They can go one-on-one with a computer. They don't need a parent or an older sibling around to use a computer.

However, many parents push their children and set up formal classes in computing. They require the children to spend a certain amount of time on the computer and to learn specific things. These "computer lessons" might kill a child's interest in computers. The child might react the way many children react to piano lessons. The lessons take all the fun out of something the child might otherwise have liked.

The second disadvantage is that in parents' haste to put children onto a high-technology track, they may be putting them on the

wrong track. Experts predict that by the year 2001, most people will be using computers as tools and resources—not to write programs. Today, computer programmers are in great demand, they enjoy high prestige, and they command high salaries. By 2001 this will no longer be true. At that time, programmers will have about the same income and status as today's automobile mechanics and TV repairmen. Parents who are obsessed with teaching their children how to move around the bits and bytes inside computers will be saddling their children with useless information and obsolete skills.

It is perfectly all right to turn a small child loose on the average computer and let them push all the buttons on the keyboard. Just make sure they don't bang on the keys too hard and that their hands are relatively free of ice cream, cat hair, and cookie crumbs. You can turn the keyboard into an "electronic playground" for the child. You and the child, together, can learn to become comfortable with the computer. And you can start helping them make the connection between the buttons they

push and the letters, shapes, and colors that appear on the screen, and the sounds that come out of the speaker.

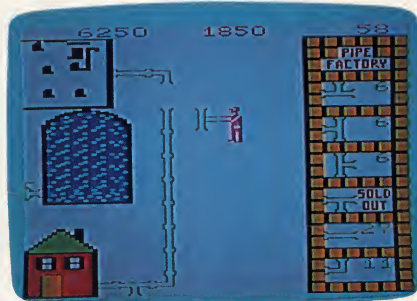
There are also dozens of programs on the market which enable a young child to use the computer to learn skills that will still be in demand in the twenty-first century: including problem solving, managing information, and creative decision making. And they can learn these skills on their own. There is no need for any parental involvement once the child has been taught how to load a program into the computer. Even three-year-olds can learn basic computer etiquette and can pick out diskettes containing their favorite programs and insert them into the computer.

Spinnaker Software, for example, has a program called *Alphabet Zoo* which creates a maze on the computer's display screen. The child gets to pick a funny little creature to wander through the maze. At the center of the maze is a colorful picture of an object or an animal (like a sock or a unicorn). The child's job is to "catch" the letter in the maze that is the first letter in the name of the object or animal. The child uses a joystick to move the creature through the maze to chase the tricky letter. *Alphabet Zoo* helps a child acquire several reading-readiness skills, including directionality, fine motor control, and recognition of letters and letter sounds.

CBS Software has a program from the "Sesame Street" people (Children's Television Workshop) called *Ernie's Magic Shapes*. This program creates full-screen pictures of the different characters on the "Sesame Street" TV show. The picture is made up of thou-

sands of tiny dots. The program paints the picture by spraying the picture dots slowly and randomly on the display screen. The child is encouraged to guess who the "Sesame Street" character is with a minimum of dots on the screen. This helps a child develop the ability to recognize patterns. Pattern recognition is an important reading and math-readiness skill.

IBM has a Learning Company program called *Juggle's Butterfly*. The program proceeds at a pace that even the youngest child can be comfortable with. It teaches directionality: up, down, left, and right.



Pipes by Creative Software (this is the Commodore VIC-20 version; the IBM version is similar).

The program divides the computer's keyboard into four invisible sectors—top, bottom, left, and right. When the child pushes a button in a particular sector, a colorful shape appears on the screen in that position. For example, if the child presses a button on the right side of the keyboard, a bright orange rectangle will appear on the screen—on the righthand side.

Like all good educational programs, *Juggle's Butterfly* has several skill levels, is easy to use, and appeals to a child's senses. When children make it to the end of one of

the games, they learn how to build a symmetrical object—a rainbow-colored butterfly. Their concepts of directionality help them construct the butterfly's symmetrical antennae and wings.

Computers are moving beyond keyboards with new peripherals that are well-suited for little children.

Futurehouse has a low-cost light pen that a child can use with the company's programs. When children recognize a colorful geometric shape (in a shape-differentiation game), they just touch the tip of the light pen against the shape on the computer's display screen. The computer instantly recognizes their choice and rewards them with a smiling face if they're right or a sad face if they're wrong. They get several chances to pick the right shape, then the computer gently shows which shapes match, or which shape is different from all the rest.

Chalk Board of Atlanta, Georgia, sells the PowerPad, a low-cost digital (multi-contact) touch pad that a child can use like an electronic fingerpainting kit or an electronic piano. The Powerpad has an empty foot-square surface. When you buy one of Chalk Board's educational games, you get a program disk and a mylar overlay that fits on the PowerPad.

One of the PowerPad's overlays has two octaves of piano keys and a musical score with ascending notes in all the colors of the rainbow. When the child presses a piano key or one of the notes, the computer plays the note and records it on a musical staff on the screen. When finished composing a song, the child can push another

button on the overlay and the computer plays the song back. The child can play the song over and over, save the song on disk, or erase the song and create something new.

Koala Technologies also makes a touch pad, the KoalaPad. The KoalaPad comes with a black plastic stylus and a paint-your-own-picture kit known as *P.C. Painter*. This program has a pictorial menu full of paintbrushes, colors, and drawing tools a child can use to create a picture. The tools enhance small children's drawing ability and enable them to do things they could never do with paper and crayons or markers. One command (LINES) lets the child create "rubber band" lines that stretch across the screen. Another command (MIRROR) lets the child draw in four different directions at once. Using MIRROR, a child can create beautifully symmetrical designs in just a few seconds. Other commands (RAY, BOX, FRAME, DISC, CIRCLE) enable a child to "grow" different kinds of geometric shapes, including rays, boxes, frames, discs, and circles.

There is even a ZOOM! command that lets a child magnify the picture to add fine details or easily erase mistakes. This is a particularly rewarding command for small children. Usually their mistakes are easy to make and hard to correct; fine details elude them. But with the ZOOM! command they can make a particular section of their picture really large. Then it is easy for them to remake the section any way they want. When they leave the ZOOM! mode, the magnified section shrinks and becomes part of the rest of the picture.

Computer programs that enable children to learn, discover, and explore on their own are wonderful. But they are also a convenient device parents can use to divert their children's attention. Sometimes this is appropriate and can be very useful—especially for a busy, exhausted parent. But it can be carried to the extreme.

When a small child indicates that she is bored and asks the equivalent of "Mommy, what can I do now?", it is easy for the mommy to turn on the computer instead of sitting down with the child and thinking up something she and the child can do together. Unfortunately, the computer, like a TV set, can quickly become a substitute for parental attention.

Computers are fascinating to children. Now there are dozens of software packages that make the child's time on the computer educational as well as fun. Busy parents will buy computers because they hope computers will help their children in school and because the computer will engage the child's attention. Computers make great babysitters.

Toddlers are especially attractive candidates for computer babysitters. Toddlers are notoriously curious, nosy, and exasperating. They also have the energy and stamina of a decathlon athlete. There must be millions of exhausted, harried mothers who would love it if a computer would distract their toddler and take them off their hands for a few minutes—or even a few hours.

This is a seductive use for computers. But no matter how friendly it is and no matter how educational, a computer isn't a good substitute for parental love

and attention. Children who interact only with a computer all day will ultimately suffer from emotional deprivation. They will learn to operate and interact with a machine, but how well will they do with human beings?

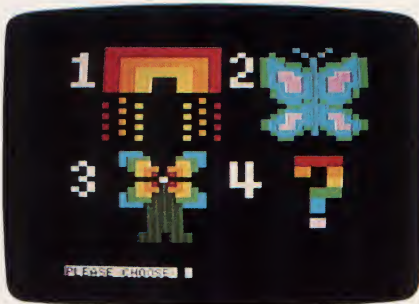
Although a computer shouldn't be a substitute parent, it can become a wonderful parental assistant. Parents can decide on a balance that meets their schedule and their child's needs. A toddler's time on the computer should be balanced between "flying solo" on a computer and group play—with a sibling, a friend, or a parent. Parents can decide on the balance based on their common sense and parental instincts.

The newest educational programs for children are what the software designers call "pro-social." That means they encourage group play and human-to-human interaction.

CBS, for example, has another Children's Television Workshop program called *Peanut Butter Panic*. Two little "Nutnik" creatures on the screen are atop a structure that is part scale, part peanut-butter machine, and part trampoline.

Two children control the Nutniks. If the children cooperate, the little Nutniks can catch the falling stars used to power their peanut-butter sandwich machine. If the children do not cooperate, the Nutniks can't catch the stars, they don't make sandwiches, and they grow skinny. Bad Snarfs fly across the screen and take away the Nutniks' remaining sandwiches.

It's great when children can work together on a computer. It helps them develop their sense of



Juggle's Butterfly by The Learning Company (marketed by IBM).



Gertrude's Puzzles, marketed by IBM.



Early Games for Young Children by Counterpoint Software.

teamwork, competition, and cooperation. However, the greatest role of a home computer is to be an "electronic hearth" around which a family can gather to learn, socialize, and have fun together. The computer can supplant television as the focal point that has captivated most families for the past 30 years.

Software companies are recognizing this new aspect of computers. When they create new learning games, they design them to be challenging and fun for all members of the family, whether they are two or 32.

A good family-learning computer game is not based on skills that will give certain family members an unfair advantage over others. For this reason, family games usually do not emphasize fine motor reflexes or advanced reading and computation skills. Instead, they concentrate on skills and abilities family members have in common: fact-finding, memory, problem-solving, shape, color, and sound recognition, logical inference, creativity, and imagination. The best programs build all these skills into a challenging game with meaningful goals and attractive characters.

For example, the *Pipes* game from Creative Software lets a child control the actions of a funny little plumber in a housing development. With some joystick jiggling and button pushing, a child can get the plumber to go to a pipe store, purchase pipes, and attach them to different buildings. With the push of a button, the child can turn on the water. What happens next is usually hilarious and often extremely educational.

Pipes is the type of game a family can play creatively and competitively. There are no sure winners based on reading ability and math skills. Even well-developed motor reflexes are of little help. Everyone begins at the same starting line.

Robert Taylor is a professor at Teachers College at Columbia University in New York. Taylor is an expert on educational computing. He is also a critic of educational computing for young children.

First, he feels that there are still too few studies of the effects of computers on young children. Despite the claims of computer enthusiasts, he fears that we still don't know if computers have a long-term positive effect on the development of children.

Second, he feels that many parents and educators are using computers to develop children's formal skills, but they are neglecting less tangible, but equally important, aspects of a child's development—including values, ethics, self-image, self-reliance, trust, kindness, gentleness, love, and loyalty. How can a child learn these things from a computer? "We can't ask computers to teach children things that we know how to teach but are not teaching ourselves," says Taylor.

Third, Taylor worries that many people are overly concerned with teaching children formal skills at a young age. Many people, he says, look at children playing and feel that they are wasting time. They look at the computer as a

way to harness the boundless energy of children and put them on a formal learning track as early as possible.

But according to Taylor and many other educators, play is a fundamental activity in the development process. It is probably the most important way that children learn. If parents were to prevent children from playing, they might severely hamper the child's emotional, social, and intellectual development.

Computers, Taylor says, are ideal instruments for play. Educational programs shouldn't just be tools to help children learn reading, writing, and arithmetic. They shouldn't exist just to prepare children to get a higher score on their SATs or a berth at Harvard or some other prestigious school. Instead, they should encourage the key developmental processes of play—strengthening children's creativity, their gift for fantasy and imagination, their ability to play roles and build models of the real world, their curiosity, and their hunger for exploration, discovery, and experimentation.

Kids like to get dirty. They like sand in their hair, mud on their shoes, and paint and gooey clay up to their elbows. Software designers should build the equivalent of sand, mud, paint, and clay into children's programs.

What are the elements of a toddler's world? Four elements of almost any toddler's world are toys, playing, problem solving, and story

making. These four elements are crucial to a child's development, and they are being built into newer computer programs for toddlers.

The earlier computer programs for toddlers concentrated exclusively on introducing them to the computer keyboard, pushing buttons, and recognizing letters, numbers, colors, shapes, and musical notes.

Now a new generation of programs—like IBM's *Gertrude's Puzzles* and *Gertrude's Secrets*, and Sierra On-Line's *Troll's Tale* and *Dragon's Keep*—are taking children on a make-believe journey into "micro worlds" inside the computer. The programs create *learning environments*—pretend stories even the youngest children can follow because they occur in simplified pictorial form, like a colorful, electronic picture book.

The children meet animated characters in these worlds—raccoons, sea serpents, dragons, clowns, and muppets. The characters introduce the children to *discovery tools*—scaled down versions of adult tools which enable a child to solve problems, conduct experiments, and learn more about the micro world. The tool might be the simplified word processor in Spinnaker's *Kidwriter* that turns the computer into an electronic typewriter. But the child can also use the "typewriter" to make pictures accompanied by music.

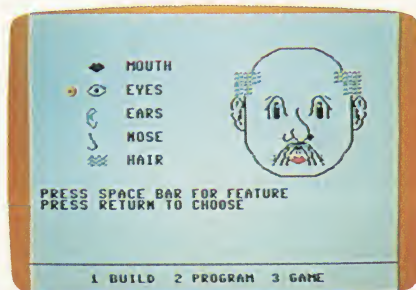
Two other simplified word processors help young children practice writing their names: short programs in *Early Games for Young Children* from Counterpoint Software and in *KinderComp* from Spinnaker. The programs animate the child's name and make it



Early Games for Young Children by Counterpoint Software.



Delta Drawing by Spinnaker Software.



Facemaker by Spinnaker Software.

dance and bounce across the screen in a variety of colors while accompanied by neat sound effects.

When children enter a micro world inside the computer, they are doing something familiar. They are doing the same thing they do under their bed, in the sandbox, or on a playground: They are playing make-believe. They are imagining worlds that are counterparts of the real, adult world, or new worlds of pure fantasy. In the context of that world, children are not "babies"—immature observers, cut off from the important decisions and events. They are important actors in that world—*heroes*. They have power, authority, prestige. What they do matters.

A *builder program* lets children use the computer as an Erector set. But it enables them to create objects they could never build in the real, 3-D world, given their limited motor skills, experience, patience, and attention spans.

For example, *Alphabet Construction Set* from Futurehouse lets children build different alphabet letters. *Creature Creator* from DesignWare lets children build funny, dancing monsters. *Music Construction Set* from Electronic Arts and *Songwriter* from Scarborough let children compose their own songs. The *Trains* program from Spinnaker lets children create and manage their own railroad. *Piece of Cake* from Counterpoint Software teaches children arithmetic by putting them in charge of a bakery.

New children's languages are also appearing that enable children to create novel programs. The programs are different from the

Companies Making IBM Software For Young Children

Reader's Digest Services, Inc.

Microcomputer Software Division
Pleasantville, NY 10570

<i>Micro Habitat</i>	Preschool	\$36.95	PC & PCjr
<i>Micro Mother Goose</i>	Preschool	\$36.95	PC & PCjr

Spinnaker Software Corp.

One Kendall Square
Cambridge, MA 02139

* <i>Alphabet Zoo</i>	4-8	\$29.95	PC & PCjr
* <i>Facemaker</i>	3-10	\$34.95	PC & PCjr
* <i>Delta Drawing</i>	3 & up	\$49.95	PC & PCjr
* <i>KIDWriter</i>	5-12	\$34.95	PC
* <i>KinderComp</i>	3-7	\$29.95	PC & PCjr
<i>Kids on Keys</i>	3 & up	\$34.95	PC & PCjr
<i>Hey Diddle Diddle</i>	3-7	\$29.95	PC
<i>Story Machine</i>	4-8	\$34.95	PC
<i>Rhymes/Riddles</i>	3-7	\$29.95	PC
* <i>Trains</i>	7 & up	\$39.95	PC

CBS Software

One Fawcett Place
Greenwich, CT 06836

Children's TV Workshop

<i>Big Bird's Special Delivery</i>	3-8	\$39.95	Cartridge/PCjr
* <i>Peanut Butter Panic</i>	7 & up	\$39.95	Cartridge/PCjr
<i>Time Bound</i>	8 & up	\$39.95	Cartridge/PCjr
* <i>Ernie's Magic Shapes</i>	3 & up	\$39.95	Cartridge/PCjr

The Learning Company

545 Middlefield Road, Suite 170
Menlo Park, CA 94025

<i>Moptown Parade</i>	6-10	\$39.95	PC & PCjr
<i>Moptown Hotel</i>	6-10	\$39.95	PC & PCjr
<i>Word Spinner</i>	5-10	\$34.95	PC & PCjr
<i>Addition Magician</i>	5-10	\$34.95	PC & PCjr

Chalk Board, Inc.

3772 Pleasantdale Road
Atlanta, GA 30340

* <i>PowerPad System</i>	2 & up	\$199.95	PC
Includes:			
<i>SuperGraphics</i> software with PRINT capability			
Card Interface (PC)			
<i>Bear Jam</i>	3 & up	\$39.95	PC
<i>Music Math</i>	7 & up	\$39.95	PC

Koala Technologies Corp.

3100 Patrick Henry Drive
Santa Clara, CA 95052-8100

* <i>KoalaPad with PC Painter</i>	2 & up	\$150	PC
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All programs are on disk unless noted otherwise.

* Program mentioned in article.



Spinnaker Software's Kindercomp.



The Learning Company's Moptown Parade.

Futurehouse Inc.

310 W. Franklin Street
Chapel Hill, NC 27514

Peripheral Vision
Computer Crayons

Bedtime Stories Series

Little Red Riding Hood
Animal Crackers

**Alphabet Construction Set*
**Light Pen*

4 & up	\$34.95	PC & PCjr
4-10	\$34.95	PC & PCjr
3-8	\$34.95	PC & PCjr
3-8	\$34.95	PC & PCjr
3-8	\$34.95	PC & PCjr
3 & up	\$34.95	PC & PCjr

IBM Corp.

Entry Systems Division
P.O. Box 1328
Boca Raton, FL 33432

HomeWord

**Juggle's Butterfly*

Bumble Plot

Bumble Games

**Gertrude's Secrets*

**Gertrude's Puzzles*

3 & up	\$69.95	PC & PCjr
3-7	\$35	PC & PCjr
5-10	\$40	PC & PCjr
5-10	\$40	PC & PCjr
5-10	\$45	PC & PCjr
5-10	\$45	PC & PCjr

DesignWare, Inc.

185 Berry Street
Building Three, Suite 158
San Francisco, CA 94107

**Creature Creator*

Spellicopter

Math Maze

Spellakazam

Spellagraph

Trap-a-zoid

Phantom of the Opera

4 & up	\$29.95	PC
5 & up	\$39.95	PC & PCjr
4 & up	\$39.95	PC & PCjr
4 & up	\$29.95	PC & PCjr
4 & up	\$39.95	PC & PCjr
7 & up	\$39.95	PC & PCjr
5-12	\$39.95	PC & PCjr

Scarborough Systems Inc.

25 North Broadway
Tarrytown, NY 10591

**Songwriter*

4 & up	\$39.95	PC & PCjr
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Counterpoint Software, Inc.

4005 West 65th Street
Minneapolis, MN 55435

**Early Games for Young Children*

**Piece of Cake*

3 & up	\$29.95	PC & PCjr
4 & up	\$29.95	PC & PCjr

Creative Software, Inc.

230 E. Caribbean Drive
Sunnyvale, CA 94089

**Pipes*

4 & up	\$29.95	PC & PCjr
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All programs are on disk unless noted otherwise.

*Program mentioned in article.

programs running on most of the world's computers. They do not calculate numbers and move information. Instead, they might make a clown's face on the screen wink, cry, or smile. They might make a little robot turtle draw a picture of a flower. They might run a model train set.

Programs, after all, are just procedures, or recipes, for getting things done. They are a list of steps to enable someone to get from here to there. When children write programs using the new programming languages, like Spinnaker's *Facemaker* and *Delta Drawing*, HesWare's *Turtle Toyland Jr.*, and Scholastic's *Turtle Tracks*, they are learning how to creatively solve problems. They are also learning the fundamentals of logical thinking and are programming the computer to do something that is meaningful to them—something that fits into their world.

Good computer programs give young children the opportunity to enhance their pretending, learning, and experimenting. They do not "program" children along a single, narrow path. They are open-ended. They provide children with raw materials to shape, then let them direct the action. Since the child's adventure inside the computer occurs in a world of pictures, sounds, and simplified symbols, even children who cannot read or write can enter these worlds.

Here are some pointers to follow when shopping for toddler software:

First, trust your common sense and parental instincts. Look for the same things you look for when you shop for a good game or

toy for your child. Will your child remain interested in the software for a long time? Will the software continue to challenge him as he grows older?

Young children change almost daily. Even if you buy shoes that are slightly too large, your children quickly grow into them. But buying children's software is not like buying children's shoes. You should not buy software that is a size too large for your child. It will only frustrate him. Good software should contain several skill levels so it can grow along with the child.

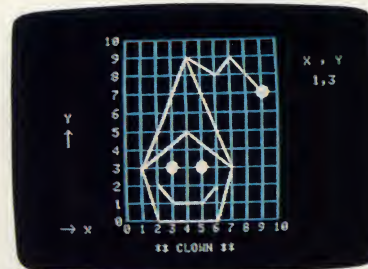
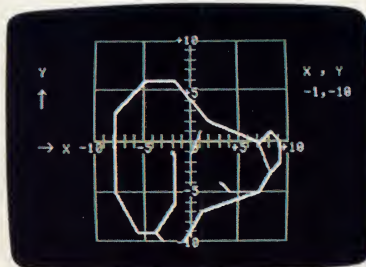
Second, good software should let your child take control of the computer. When you watch your child using the software, ask yourself this question: Is my child programming the computer or is the computer programming my child?

Little children have few opportunities to be in charge. They are taught by the rest of the world, but they rarely have the opportunity to act as teachers. Good software lets a small child be in charge, and it encourages the child to play the part of teacher.

Third, good software should be appealing to all members of the family. If it seems juvenile and boring to you, it will probably seem juvenile and boring to your child, too.

Good software should encourage *peer tutoring* and *adult tutoring*. Normally the flow of knowledge in a family is from the top down—from parents to children and from older siblings to younger siblings. But one of the marvelous things about computers is that they encourage children to teach each other; and they encourage *children to teach adults*.

When you buy good software,



Bumble Plot and Bumble Games, marketed by IBM.

Electronic Arts

2755 Campus Drive
San Mateo, CA 94403

Cut/Paste	3 & up	\$50	PC & PCjr
Hard Hat Mack	5 & up	\$35	PC
Pinball Construction Set	5 & up	\$40	PC & PCjr
*Music Construction Set	5 & up	\$40	PC & PCjr

HesWare (Human Engineered Software)

150 North Hill Drive
Brisbane, CA 94005

*Turtle Toyland Jr.	4 & up	\$40	PC & PCjr
Cell Defense	5 & up	\$40	PC & PCjr

Sunburst Communications Inc.

Pleasantville, NY 10570

Memory (School version)			
K-2 (4 programs)		\$150	
K-4 (7 programs)		\$210	
K-6 (10 programs)		\$250	
Memory Castle (Home version)	5-12	\$39.95	PC
Getting to Read and Add	4-8	\$39.95	PC
The Pond	5-10	\$39.95	PC
Hot Dog Stand	5-10	\$49	PC
Missing L-nks (Foreign language version)	7-12	\$39.95	PC
The Factory	7 & up	\$39.95	PC

Scholastic Inc.

906 Sylvan Avenue
P.O. Box 2010
Englewood Cliffs, NJ 07632

Spelldiver	6 & up	\$39.95	PC & PCjr
*Turtle Tracks	6 & up	\$39.95	PC & PCjr

Sierra On-line Inc.

Sierra On-line Building
Coarsegold, CA 93614

*Troll's Tale	4-8	\$29.95	PC & PCjr
*Dragon's Keep	4-8	\$29.95	PC & PCjr
Story Maker	5-10	\$34.95	PC & PCjr
Wizard of Id WhizType	4 & up	\$34.95	PC & PCjr
Wizard of Id WhizMath	6 & up	\$34.95	PC & PCjr
Quest for Tires	5 & up	\$34.95	PC & PCjr
Oil's Well	7 & up	\$29.95	PC & PCjr

Brøderbund

17 Paul Drive
San Rafael, CA 94903

Bank Street Writer	4 & up	\$79.95	PC & PCjr
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All programs are on disk unless noted otherwise.

* Program mentioned in article.

be prepared to hear calls of "Mommy! Watch me!" and "Look at my new picture! It's my best one!" As you follow your children's progress, you will learn a great deal yourself. Good software should involve the entire family and encourage them to play and learn together.

Fourth, if you can afford it, buy a computer that has a disk drive or a cartridge slot. Tape drives and cassettes are much less expensive, but they are much slower and more difficult to use, especially for younger children. Small children require much more adult supervision when they use programs on tapes, and they grow bored and lose interest with computer programs that take forever to get started.

Fifth, software is expensive, so you should never buy new software unless you and your child have *both* sat down and previewed it. Don't trust the glossy artwork and testimonials on the cover of the package. New programs are being advertised and packaged the same way as beer, perfume, and records—with a lot of gloss and inflated claims. Don't trust these claims. Shop for your software at stores that let you and your child use the software before buying it.

Sixth, go to the newsstands and flip through the computer magazines. The magazines review most of the major new software packages. You can get a good idea about whether the software is right for you and your child by browsing among these magazines.

Seventh, don't just look at the explicit things the software teaches (like counting or shape recognition). Also look for the intangible things that the software teaches.

These intangible things may have a deeper, more long-lasting effect on your child. Ask yourself these questions: How does this software reward my child when he gives a correct answer? What happens if my child gives an incorrect answer? Does this software help build my child's independence, self-confidence, and self-image? Does it encourage him to experiment? Does it support our family's social values? Is it nonviolent? Nonsexist? Does it encourage sharing and cooperation?

The most important trait of computers is not their ability to calculate, but their ability to *interact*. How does the software make the computer interact with you and your children? Be critical. When you review new software, you can apply the same standards for politeness and friendliness that you apply to people. If people are kind, friendly, and caring, you immediately know it. The same goes for computers.

Computers should not be judgmental. They should never punish children or tell them they have failed. Instead they should be patient, humorous, and entertaining tutors. They should help children do what they want—like any good companion, helper, or tool.

Eighth, good software should meet the acid test of letting children do something they can do only on a computer. Otherwise you might have just bought an expensive pencil.

Also, it should enable them to do something better on the computer than on any other medium. For example, my eight-year-old daughter bangs on our family piano for hours, but she uses the family computer to compose her

own music. And my five-year-old son leaves scraps of paper around with his scribbles, in pen and magic marker, but he creates elaborate, multi-colored tiles, revolving planets, and cartoon pictures on our family computer.

Good software amplifies and extends children's abilities. It enables them to create things effortlessly without being swamped by mechanical details. It also lets them go back to their creations and quickly polish them and change them. It lets them save their creations to show their friends and their family. It couples all these expanded abilities with the imagination, fearlessness, and curiosity that children have in such abundance. The result is a fertile environment for learning.

So, can toddlers tackle computers? My answer is an enthusiastic yes! But with several important qualifications. For the computer to become a healthy, beneficial experience for your toddler, it must be part of an overall learning environment in which parental attention, support, and affection still come first.

The computer by itself is just a bulky, overpriced paperweight. It is only one part of your child's learning experience. To play a positive, major role in a child's development, the computer must be assisted by good software and by the active participation of the parents.

Parents can't expect to buy a computer and turn their toddler loose on it. Learning on a computer is a joint experience. You, the computer, and your child are in it together. And together, you're going to have a lot of fun. □

Computing For Families

FRED D'IGNAZIO, ASSOCIATE EDITOR

To Program Or Not To Program

Many parents would like their children to become computer literate and, in the bargain, acquire some computer literacy themselves. And many parents believe that the first step toward computer literacy is to learn programming.

What they may not realize is that experts are now redefining computer literacy, and the experts can't agree on what it means, even among themselves.

Just a couple years ago there was a consensus that computer literacy meant learning how a computer works (on the inside) and learning one or more programming languages. When the children's programming language, Logo, became popular on microcomputers, parents and teachers saw it as a computer-literacy language for themselves and their youngsters.

Today many experts criticize the older definition of computer literacy. They point out that computers are changing rapidly, and that our younger children won't enter college or the job market until the 21st century. If we teach our children today's programming languages and how today's computers work, we may be miseducating them and giving them information that may be useless by the time they are grown up.

Furthermore, many studies have now been conducted on the influence of Logo on children's development and learning, and on the appropriateness of Logo for children. In a study made at the Bank Street College of Education, for example, researchers found that students who learned Logo did no better academically than those who didn't learn Logo.

Also, all programming languages, including Logo, have several features that make them inappropriate for children. First, a child's attention span is limited and related directly to things the child perceives as being meaningful. Logo and other languages require children to type several commands into the computer just to achieve a meager result, such as directing a little screen cursor (called a *turtle*) to draw a circle. Children don't perceive this as especially meaningful, since they could do the same thing in a

couple seconds on a piece of paper. (I have two small children and know this to be true from personal experience.)

Second, in the future, even though almost everyone will be using computers, it's unlikely that most people will need to know languages like Logo. In the future, most people will use computers as an *appliance*—to help them file and recall information, send electronic mail, prepare records and reports, draw diagrams and pictures, play music, and organize and analyze numerical and textual information.

To do all these things people *will* need to learn how to program. But the "programming" will not be in Logo (or BASIC or Pascal or COBOL). It will be in special-purpose languages. And the process will resemble choosing items from a restaurant menu and carrying on a conversation with the computer. The computer will ask the person questions and present them with choices. Then it will do the programming itself based on the person's responses.

Languages like Logo are very limited and primitive when it comes to doing something meaningful and practical on a computer. People can use Logo to write letters, calculate numbers, process records, and draw complicated diagrams, but it requires a prodigious amount of work. This is because Logo is essentially a *graphics* language—a language for drawing pictures on the computer's display screen. Making Logo do more than draw pictures is an inappropriate use of the language. And, for most families, it's not worth the effort.

The New Computer Literacy

Parents who want their families to become computer literate shouldn't focus their efforts on learning to program or learning about a computer's bits and bytes. Instead they should concentrate on acquiring lots of software—from magazines, books, user groups, clubs at school, and by purchasing commercial software.

The type of programs to look for are those which make the computer simulate other instruments and machines that their families are likely

to need or want to master. For example:

- *Word processing programs* that turn their family computer into a sophisticated typewriter.
- *Communications software* that turns the computer into an electronic telephone, bulletin board, post-office box, mail-order catalog, and library.
- *Filing-cabinet software* that lets them file and organize family records.
- *Musical software* that turns their computer into a music teacher and musical instrument.
- *Learning software* that turns their computer into a teaching machine.
- *Paintbox programs* that turn the computer into a digital palette and electronic canvas.

Families will still have to "program" all of this software, but the programs will be easier to write, more practical and meaningful than the programs they might write in Logo.

Creative Expression And Powerful Ideas

Within this context, however, it still makes sense for families to experiment with a language like Logo, as long as they have realistic expectations. Logo, after all, is one of the easiest languages for children and adults to learn. Also, it is excellent for making pictures. Making pictures on the computer's screen can be a lot of fun, and can stimulate a child's creative and artistic abilities.

Beyond this, programs of any kind and in any language can be an exciting medium for creative expression. People who have learned to program feel the same kind of pleasure that woodworkers feel in making cabinets and tables, that painters feel in working with paints, or that musicians feel in playing a piano, a saxophone, or a guitar.

And underlying any programming language—whether it's Logo, a data base language, or a machine language—are a cluster of *powerful ideas*. These ideas relate to the computer's primary function as an information organizer and processor. People who learn to

program often are so influenced by these ideas that they incorporate them into their thinking *away from the computer*.

The ideas include several popular computer programming techniques, such as:

- Breaking large, complicated problems into smaller, more manageable ones.
- Storing and displaying information in two-dimensional tables (arrays or matrices).
- Sorting, storing, recalling and cross-referencing information according to some common trait.
- Taking a step-by-step approach to solving problems and accomplishing tasks.
- Refining ideas in a multistep debugging process in place of making snap "right" or "wrong" answers.
- Building complex ideas and creations by combining smaller, simpler ideas and creations.
- Transforming geometric, statistical, and mathematical symbols into pictures, and from pictures back into other symbols.
- Learning that ideas, information, and symbols of all sorts can be malleable, like clay, and can be reshaped, transformed, and expressed in many different ways.

These are just a few of the powerful ideas that programming a computer can teach. And they are ideas that can be carried away from a computer and used inside one's head, or with a pencil and a piece of paper, in all aspects of daily life.

Alternatives To Logo

If your family is interested in learning a language like Logo, you should be aware that there are alternatives. You don't need to buy Logo itself. Instead, you can buy any one of a number of Logo-like languages now on the market. These languages include *Turtle Toyland, Jr* from HesWare, *Turtle Power* from IBM, and *Delta Drawing* from Spinnaker Software.

These languages may be a great deal less expensive than Logo, and they may have features that Logo lacks. □

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THE MAC IN BOSTON

The Apple Macintosh had its coming-out party at the monthly meeting of the Boston Computer Society on Monday evening, January 30.

The atmosphere was a cross between a football pep rally and a gala rock concert. People jammed into the elegant John Hancock Hall and filled it to the chandeliers. Everyone was talking loudly and pointing up at the stage.

On the stage was a dark brown speaker's podium and a table with a fabric bag on top. The crowd stared hungrily at the bag as if it contained a picnic supper.

High-Tech Rock Video

The lights dimmed. Huge speakers on the stage blasted the audience with a hard, driving rock beat. The audience began clapping to the beat.

Two giant video screens above the stage lit up, showing pictures of men, women, kids, old people, young people, black, and white people using Apple's new Macintosh computer. The pictures appeared on the screen, one after another, accompanied by the theme from Flashdance.

The music stopped. The clapping grew louder. Steve Jobs, the inventor of the Apple computer and the project manager of the Macintosh, climbed onto the stage, smiling and waving. People began cheering. The noise was deafening.

A Jungle Missionary

In recent years, I have become a critical, skeptical observer of the computer industry. But as I watched Steve Jobs on the

stage, I couldn't help but be thrilled.

I have been involved with personal computers for over nine years, since 1975. I have been carrying my message and my enthusiasm about these computers to children, parents, teachers, librarians, and to anyone else who would listen.

However, despite my efforts and the efforts of thousands of others like me, most people are still not all that impressed with personal computers. But now I was in an auditorium with people cheering their lungs out for a new computer and for the man--and the men and women--who had made it possible. I felt like a jungle missionary who had just made a pilgrimage back to the Mecca of his faith.

From Alf to Woz

I got the call to be present at Mac's (the Macintosh's) coming out party the Friday before. I was at home playing Alf in the Color Caves with my two children, Catie and Eric. The phone rang. It was Andrea Cunningham of Regis McKenna, Apple's public relations company. "Come on up to Boston," Andrea said. "You'll get a chance to see Steve and the Mac."

Andrea said come, and (with Compute!'s blessing) I went.

Monday night I was at the Ritz Carlton Hotel in Boston at the press reception that preceded Mac's public debut at the John Hancock Hall.

The press reception was unbelievably elegant. Stiff, white gloved waiters showered me with exotic hors d'oeuvres and, in general, treated me like a visiting dignitary from Ethiopia.

As I looked around while munching on who-knows-what, I went into seventh heaven. I was surrounded with some of the computing world's biggest superstars and celebrities. Five feet away, Steve Jobs was smiling and talking with Mitch Kapor of Lotus. Dan Bricklin (the co-inventor of VisiCalc) floated around the room like a tall bearded Rabbi dispensing blessings and salutations. I caught a glimpse of a bearded, round Steve Wozniak, the co-inventor of the Apple computer, over in the corner of the room.

I wandered around the room talking with everyone as if this sort of thing happened to me every day. All at once I found myself in a conversation with Steve Wozniak. Wozniak—or "Woz"—was talking about his current role as a senior engineer on new enhancements for the Apple II computer. "The Apple II computer is not dead," Woz was saying. "We've got some amazing new features for the Apple II. You'll see them over the next few months."

Woz was a joy to talk to. Dressed in blue jeans and talking casually, he seemed very much at ease in all the glitter. I wondered if he had changed at all since 1976 when he and "the other Steve" were building the first Apple in a California garage.

Sneaking Through the Side Door

After the press reception, the Mac P.R. team from Regis bussed everyone from the Ritz to the John Hancock Hall.

Boston was a city in deep freeze. Snow flurries drifted

down on the heads of hundreds of people huddling together outside the hall, waiting to get inside.

The bus drove around the far side of the hall away from the crowd. We hurried off the bus and sneaked into the hall through a side door. I felt like a rock band member trying to sidestep his fans. The feeling of adventure and intrigue was delicious.

And Now a Word from Mac

One of the highlights of the show in the hall came when Steve Jobs turned over the program to the Macintosh itself.

"The Macintosh is the third milestone in the personal computing revolution," Jobs said as he walked over to the table at the center of the stage. "First came the Apple II in 1977." An Apple II appeared on the giant screen overhead.

"Next came the IBM PC in 1981." A PC appeared on the video screen. The audience began laughing. The image of the PC on the screen was out of focus and almost unrecognizable.

"And now, in 1984," Jobs said, as he reached the table and put his hands on the box, "we have the Macintosh, the third milestone and definitely the greatest. It is so great it is insanely great." People laughed. The words "INSANELY GREAT" appeared in giant letters over Jobs' head.

"This machine eats 8088s for breakfast," Jobs continued. "Its Motorola 68000 cranks along at 8 MegaHertz and processes over a million instructions a second. It has four musical voices and a speech synthesizer built in. Its screen has twice the dots

of an Apple II or a PC. Yet the whole computer weighs only a third of an IBM box.

"Now it's time to meet Mac in person."

With a theatrical flourish Jobs unzipped the fabric case and lifted the Macintosh out of the bag. An instant later he had connected the power cord, the keyboard, and the mouse.

He switched on the computer. The screen over Jobs' head turned sky blue. "All the images you see," he said, "are generated by the Mac."

Jobs looked at the blank screen. "Ah, yes," he said. "We need a disk." He reached in his shirt pocket and pulled a tiny 3-1/2-inch disk out and waved it at the audience.

Jobs inserted the disk in the computer. The letters "M - A - C - I - N - T - O - S - H" marched, one by one, across the Mac's screen and across the giant screen above the stage. The letters marched in time to the theme from Chariots of Fire that blared from the stage's gigantic speakers.

"And now," Steve said, "a word from Mac." He gestured to the computer.

Mac came suddenly to life. "Thank you, Steve," it said. Its voice was mechanical and computer-like, but it was easy to understand and strangely imbued with personality.

Mac gave a quick, crisp introduction to itself. It showed the audience how to access files, how to use its MacWrite and MacPaint programs. Then it gave a dazzling graphics display. It finished its performance with the words of advice: "Never trust a computer you can't lift."

"And now," said Mac, when the audience finished clapping, "back to Steve."

A Computer That Feels Good to Touch

When I saw Steve place his hands on the Macintosh bag, I remembered the bag I had seen earlier at the press reception at the Ritz. When I saw that first bag, I immediately went over to inspect it. Inside and out it reminded me of a rugged but stylish backpack from L.L. Bean. Inside the bag were lots of pockets and little compartments. I ran my fingers over the roughly textured surface of the bag. It felt good.

The bag made me like the Macintosh. It was the first piece of computer "equipment" other than a computer keyboard that had ever appealed to my sense of touch.

The Software Monastery

When I saw Jobs pull the Mac out of the bag and hook it up so easily, I remembered an experience I had had earlier in the day.

That afternoon, before the press reception, I had come out of the Ritz and hailed a cab. The cab took me over the icy Charles River to Cambridge and to the Spinnaker Software Corporation, one of the biggest publishers of children's and family software.

When we arrived at Spinnaker, I got out of the cab and picked my way around mounds of dirty, gritty slush that floated like icebergs on Boston's greasy, slippery streets.

I found Spinnaker deep in the bowels of a giant, brick building. The building was once the headquarters for the Athenaeum printing company, and now was converted to offices, a health club, a bar, and a restaurant. Walking along the arched, bricked basement corridors toward Spinnaker, I felt like a monk strolling through a medieval monastery.

When I got to Spinnaker, I met with Bill Bowman, the company's Chairman. I told Bill about the Mac's coming-out party that night, and he suddenly jumped up in great excitement. "We've got the first Mac in Boston," he said. "Come with me. It's still in its box. We'll unpack it and you can turn it on and try it out."

He hurried out of the office.

Unboxing the Mac

As I followed Bill through the mazelike corridors of his staff's offices, I said, "Bill, you've got to be kidding. We don't have time to unbox the computer and get it working. Anyway, do you really think it'll work the first time you turn it on?"

Bill turned to me and grinned. "How long do you think it'll take to get it working?" he asked.

"About four hours, minimum," I said. "I just opened a new home computer last weekend, and that's how long it took me to get it unpacked and up and running."

Bill stopped in front of a small box on the floor. "This is the Mac," he said. "Let's see how long it takes us."

With some scissors we popped the staples off the box and pulled out the Mac's combination monitor and disk drive. Next we pulled out the keyboard and the mouse. We rushed off to a programmer's office and tried to set up the machine.

We had forgotten the cables. We ran back to the Mac's box and discovered some small boxes with cables inside. The boxes were clearly labelled with colorful pictures.

We ran back to the office, hooked up the cables, and plugged the Mac into a wall outlet with one plug. We loaded a disk, and the computer came to life.

Bill looked at his watch. All in all, from start to finish, it had taken us only seven minutes to unbox the Mac and get it running. A minute later we were drawing pictures using MacPaint. We would have been even faster if we hadn't forgotten the cables.

A Computer to Get Intimate With

In my columns in Computel, Gazette, and PC & PCjr, I have written extensively about what I call "computer intimacy." Computer intimacy, I think, should precede, or even replace, computer literacy.

You are intimate with a computer when you feel comfortable, relaxed, even cozy with it. You are intimate with a computer when you feel playful, happy, and productive when you use it. You are intimate with a computer when you can use it as a medium for self expression, an outlet for your imagination or sense of humor. You are most intimate with a computer when it becomes invisible, and there is nothing separating you from your work,

your ideas, your images, or your fun. You are intimate with the computer when you develop excuses to use it.

After using the Mac at Spinnaker I feel that the Mac is a computer that lots of people will want to get intimate with. The Mac is like "computer popcorn." Once you begin using it you will find it hard to stop.

The Second Desktop Appliance

That night, after Mac had made its presentation and had turned the program back over to Jobs, Jobs spoke about the potential market for the new computer. "The Mac is a desk appliance," he said, "the first since the telephone.

"Up until now computers have been like telegraphs. Over a century ago, when the telegraph was invented, people predicted the day when telegraph terminals would be on everyone's desks. But telegraphs were too difficult to use.

"Then the telephone was invented. It was easy to use so everyone could use it. It brought people in touch with other people so it was useful to everyone. Soon everyone was using the telephone and the telegraph virtually disappeared.

"The same thing will happen with personal computers. Only a fraction of the 235 million people in this country can use personal computers. But the Mac is different. Like the telephone, it is a desk appliance. It is the computer for the rest of us."

A Means to an End

Earlier in the evening, at the press reception, I had been talking with Mike Murray, Marketing Manager for the Macintosh. Like Jobs, Murray called the Macintosh an appliance. "I looked up appliance in the dictionary," Murray said, "and it said that an appliance was 'a means to an end.' That's the Mac. It's a means to an end."

That night, filled with the thrill of the occasion, I just nodded at Mike and grinned. "A means to an end," I thought. "That's neat."

At that time, it looked to me that Apple had solved the problem of making computers useful and attractive to everybody. In the Mac they had created the first mass-market computer appliance.

The following morning I returned home to Roanoke. That afternoon I looked up appliance in my own dictionary. My dictionary defined appliance as 'a machine designed for a particular use.'

All of a sudden I realized that Apple had cleared only one of the two hurdles that have prevented the average person from using a computer. First, despite manufacturers' claims, computers have never been easy to use. Second, no one has yet come up with a computer with a particular use that makes everyone want to use it.

The Mac isn't as easy to use as a telephone, but it is still easy to use, so I'd say Apple has cleared the first hurdle. Unfortunately, unlike the telephone, the Mac does not have a

clearly defined use that is obvious to everybody. The telephone puts people in touch with each other. But what does the Mac do that is comparable?

The Mac is clearly a milestone in the personal computing revolution. It does everything better and easier than almost any other affordable computer. But it does nothing new.

The First Activity Appliance

Yet Mac is special, so special that it still may eventually become an appliance on everyone's desk.

One way for Mac to become a mass-market computer is to sidestep the whole question of "What do I do with it?" One way to sidestep this question is to replace it with another question: "What kind of appliance is Mac?"

Some people say Mac is an information appliance. Others say it is a knowledge appliance. Still others say it is a graphics arts appliance. Like the phone, it is also a communications appliance. So what kind of appliance is Mac?

I think it is an appliance unlike any appliance we've seen before. I think it is an activity appliance. It lets you do activities. You decide which activities you want to do using Mac.

This is a disappointing definition--until you look at how Mac lets you do activities. What Mac does is less important than how it does it.

First, Mac lets you individualize everything you do. You can personalize the way you play, the way you work, the way you

interact with the rest of the world. Mac becomes an extension of yourself. It lets you put your stamp, your personal image, on everything you do. This is a supremely satisfying feeling.

Second, and most important of all, Mac makes whatever activity you do exciting.

If this sounds like gobbledygook, good! I advise you to be skeptical. Don't take my word for it. Go down to your local Apple dealer and try Mac for yourself. Then reread this article and see if I'm not right.

Apple will be able to sell tens of millions of Macs if it can just convey these two simple qualities to people. Mac can not do anything new. But it can make whatever you do more joyful, and more exciting. It makes everything you do a personal statement of who you are and how you see the world.

What Makes Mac Exciting?

The excitement you feel when using Mac is difficult to describe because it comes from lots of little, intangible, almost subconscious features.

These are the things I noticed when I played with the Macintosh at Spinnaker:

First, I found that using Mac is intuitive. At most points when you want to do something, you can guess how to do it. Mac does things the way you feel they ought to be done.

Second, Mac is a graphic arts machine. Everything the computer can do is represented pictorially. There are no exotic commands, no unintelligible error messages, and no control

characters. When you do something, you see the end result on the screen, almost instantly.

Third, the Mac is manageable. When you take it out of its box, you are not overwhelmed with snakelike cables, power cord adaptors, disk drives, and hefty manuals. It was easier to set up the Mac than it was to set up the new TV my family got for Christmas.

Fourth, the Mac's keyboard is unlike all other computer keyboards. It looks familiar--like a small typewriter keyboard. There are no rows of intimidating function keys and ominous keys like HELP, ESCAPE, BREAK, and RUN.

Fifth, even a simplified keyboard is still too much for many people. This is where the Mac's mouse comes in. Believe it or not, the mouse really is easy to use. For many applications, the mouse completely replaces the keyboard.

Sixth, the Mac's menus are very friendly and they do not slow you down. After only a couple minutes' practice I was zipping around inside an activity, using the menus without breaking my stride.

Seventh, like a nice person, the Mac is "user forgiving." The Mac lets you get out of any mistake by selecting the UNDO function. No matter how disastrous your last action was you can immediately undo it.

Eighth, the Mac is light (only twenty pounds). Its bag (at \$100), its few parts and cables, and its light weight make it easy to carry around with you. To be personal a computer should

be portable. Now, wherever you go, you can take your computer with you.

Last, the Mac does away with some of computers' most irritating habits. For example, many computers are extremely sensitive to voltage fluctuations and momentary brown-outs in household electrical current. The Mac is not.

Also, the Mac is tall and skinny. Unlike most computers, it does not hog your whole desk or kitchen table.

People First

It is significant that the Mac was announced in 1984, the year described in George Orwell's futuristic novel.

The future George Orwell predicted in his 1948 novel never came true—in the U.S., at least. But some of the characteristics of Orwell's future are very much in evidence.

Recently I visited two of the largest computer companies. I was impressed with the professional competence of the people I met at the companies. But I also noticed how faceless everyone was. Individuals in the company were doing marvelous things, but their efforts were swallowed up inside the overall corporate image. This style of management left me with the strong impression that people in the company were seen as unimportant. Only the company was important.

Second, I have been aware, for a long time, of the way the computer industry is fossilizing. Computer companies' bold, new technological advances have been replaced by efforts to market and package old products to larger and larger numbers of people.

Most experts agree that computers are still in the Model T stage (or, as Apple says, after the introduction of the Mac, in the Model A stage). They are immature products that need to evolve a long way before they become "modern" appliances. We are just at the beginning of the personal computer revolution.

But companies are not acting like revolutionaries any longer. With executives borrowed from the mass-merchandising industries, computer companies are beginning to resemble more traditional companies. Computer companies are now selling computers the same way other companies sell tubes of toothpaste or boxes of detergent.

This brings us to Apple and the introduction of the Mac. In my opinion, with the announcement of its new computer, Apple has taken a stand in opposition to both of these "1984-type" trends.

First, its Macintosh is a bold, new computer. It is not another lookalike. It is completely unlike any other machine in the same price range. It offers a great amount of exciting personal computing for its price.

Second, the Mac was not introduced as a company product. It was introduced as the product of the efforts of lots of individuals. Apple obviously values people, and it made its values clear in its introduction of its new computer.

This Crazy Group of People

After Jobs and Mac completed their presentations in John Hancock Hall that night in Boston, Jobs called his core team of

Mac engineers and programmers up on the stage to demonstrate the Mac and to answer the audience's questions.

The Mac team ran down the aisles and poured up on the stage. People in the audience began clapping wildly. The team responded by waving and grinning.

The Mac team--twelve men and one woman--were as diverse in their dress and personalities as they could be. Some wore ties, others wore blue jeans and t-shirts. Some were shy and withdrawn. Others were just as outgoing and theatrical as Jobs and Mac.

Jobs spoke of his team as "artists." He showed a slide show of the team members at work on the Mac. "We prepared this slide show," he said, "to try to capture some of the energy of this crazy group of people."

At the conclusion of the slide show, one of the programmers, Bill Atkinson, speaking for the team, said, "We are hoping that through the Mac we can leverage our energy into the world at large."

The last slide showed the inside of the case that covers the Mac's monitor, disk drive, and circuit boards. On the side of the case of every Macintosh are inscribed the names of the members of Mac's team.

The Right Stuff

Many people have begun comparing the team to the astronauts. The members of the team are called the "astronauts of computing." Their idealism, their individual genius, their devotion to their

work, and their standards of excellence are like the manned space program astronauts' highly touted "right stuff."

There's no question that the Mac team has the right stuff. But I'm not sure they should be called astronauts. In fact there is no direct comparison with the manned space program.

The small number of astronauts in the space program were just the top of a pyramid of thousands of faceless individuals whose efforts made the astronauts' great achievements possible.

With Apple this pyramid is upside down. The right stuff demonstrated by the team of Mac programmers and engineers has been infused into the Macintosh computer. This team represents the small point at the bottom of the upside-down pyramid. The Macintosh, hopefully, will eventually be used by millions of us. We represent the broad base at the upside-down pyramid's top.

The team, unlike their counterparts in the space program, have gotten well-deserved recognition and praise for their efforts.

And who are the astronauts of computing? We are, all of us. New generations of computers like Mac will give all of us the right stuff. With new computers like Mac we can all soar.